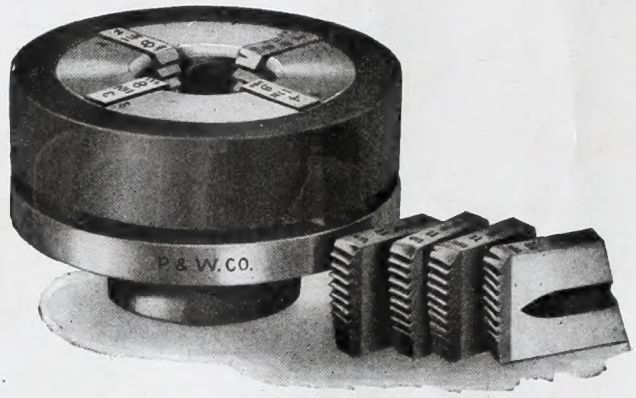
EDITORIAL INDEX—PAGE 210 BUYERS' DIRECTORY—PAGE 95. ADVERTISING INDEX—PAGE 112

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXII., No. 8. Publication Office: Toronto, August 21, 1919. Subscription Price $3.00 per year.

SMALL TOOLS



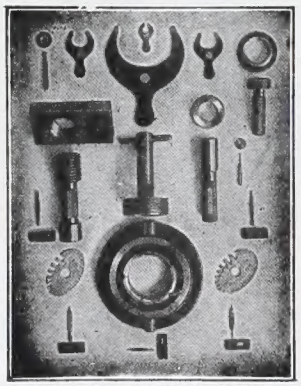
PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.

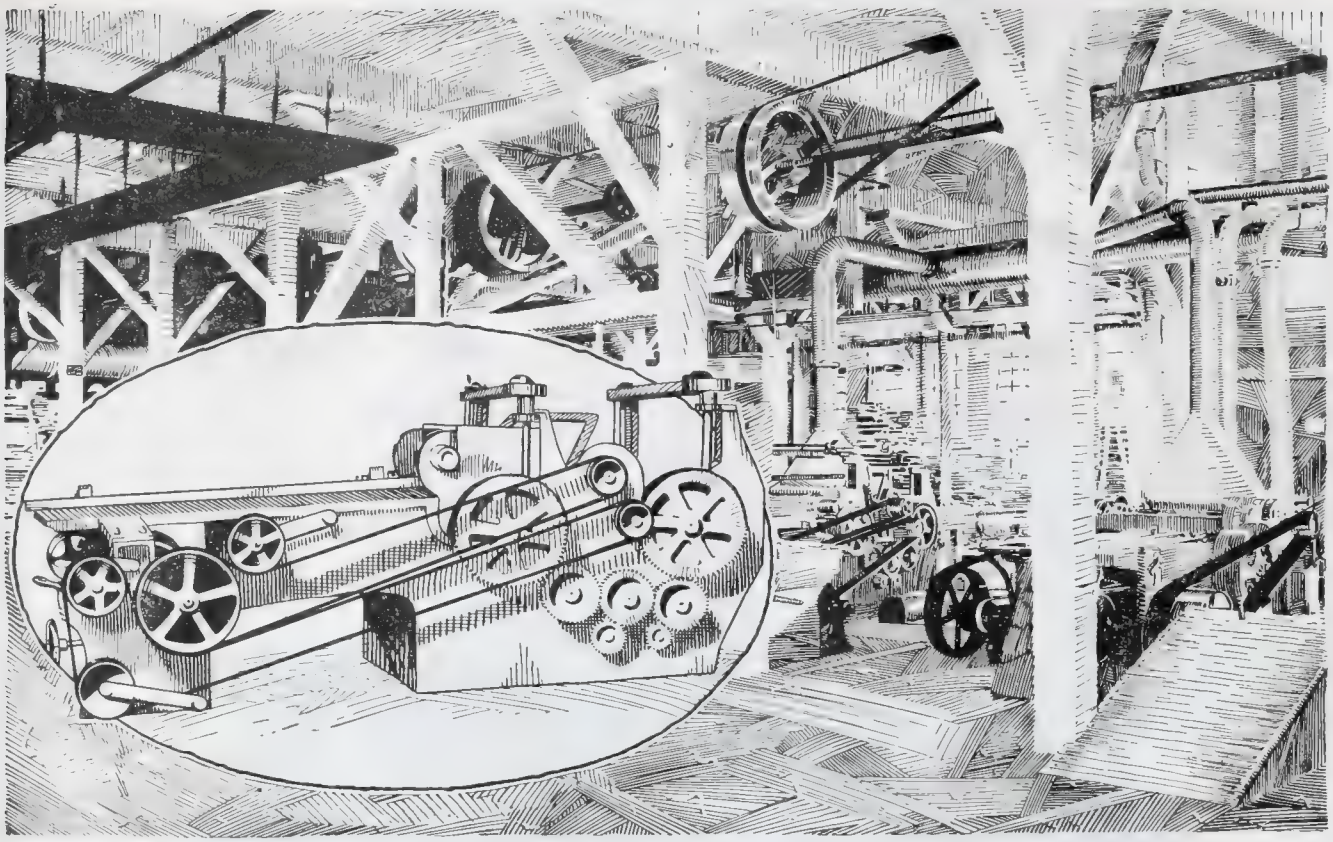


PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

PRATT & WHITNEY CO.
OF CANADA, LIMITED

Works: Dundas, Ontario

MONTREAL	TORONTO	WINNIPEG	HALIFAX	VANCOUVER
723 Drummond Bldg	1002 C.P.R. Bldg.	1205 McArthur Bldg.	Davidson Building	B.C. Equipment Co.



Scene in the Haley Mill Showing Goodyear Extra Power Belting in Use.

Another Convert

HALEY & SON,
Lumber Merchants

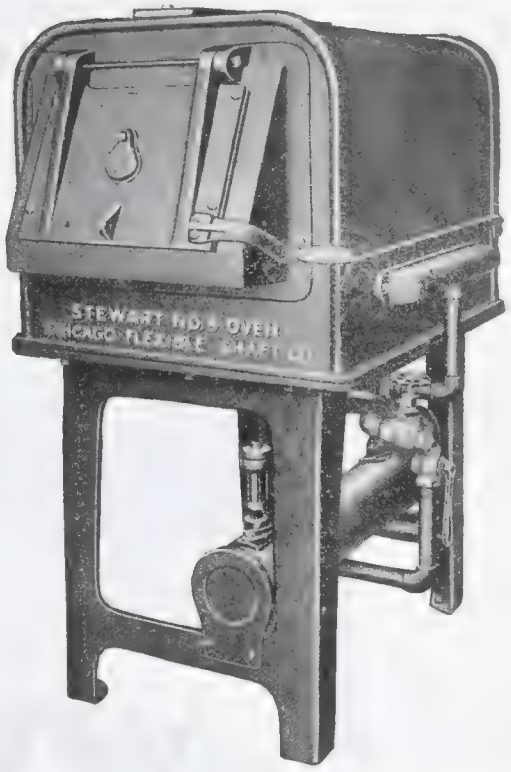
Gentlemen:—

We want to tell you about the Goodyear Extra Power Rubber Belting we bought for our new mill two years ago and what great satisfaction this Belting has given us. As you are aware, we bought this kind of belting from you for the equipment of our mill **throughout,** even to planers and matchers. We were skeptical at the time about using this belting on our matchers, especially on the side heads, as that is a very trying place for any kind of a belt. We concluded we would try your rubber belting, as we thought then as a makeshift. Now it has been something over two years since we belted up our matchers with your belting and the original belts are yet on these machines and still giving good service. We thought where this belting of yours had proved so eminently satisfactory that we should tell you just as we thought about it and you know we are giving you this testimonial of Goodyear Extra Power Rubber Belting entirely at our own initiative.

Yours truly,
HALEY & SON.

GOODYEAR
MADE IN CANADA

Gas Furnace Triumphs Over the Electric at Providence



Competition is keen in Providence, R.I., and therefore both the Electric Company and the Gas Company employ the best brains and selling talent on the market.

An Electric Furnace was recently installed in the Tool Room of a large manufacturing plant in that city, and it looked like a real triumph for the Electric Company, as the Gas Company, also, had been hot on the trail.

But the Gas Company wasn't discouraged.

They advised the customer to give the electric furnace the fairest kind of a trial.

They didn't knock.

But they did do a lot of figuring of costs, and the result was so convincing that the customer agreed to the installation of a Gas Furnace, on trial, and then things got exciting.

The Customer, the Gas Man and the Electric Man all three watched and checked the performances of both furnaces.

Here is what they found out:

1. The Electric Furnace was costing $20.00 per week.
2. **The Gas Furnace was costing $13.84 per week.**

The Gas Furnace has replaced the Electric in that Providence factory.

Stewart Gas Furnaces and Ovens

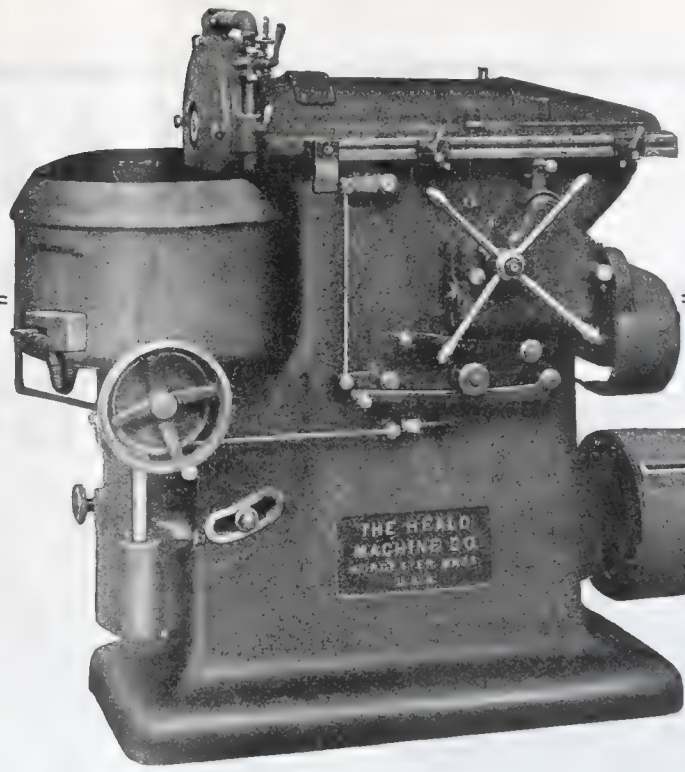
are doing more every day to demonstrate the superiority and the economy of Gas for Industrial uses over the use of electricity than any other one factor.

Is your Industrial Department aware of this, and if so are they using the information in your business-getting campaign this year?

There are over one hundred types of **Stewart Gas Furnaces and Ovens** being manufactured and sold to-day. Send for our illustrated catalog.

CHICAGO FLEXIBLE SHAFT COMPANY

1148 So. Central Ave. **Chicago**



BUILT IN TWO SIZES 8" and 12".

The New Surface Grinder you have been looking for

The new HEALD No. 20 and No. 22 MACHINE is a simple, productive and accurate rotary surface grinder. That the new machines meet the first requirements can be seen from the photograph above.

In regard to production and finish, experiments have proven these new machines have no equal in the field to-day.

The WHEEL SLIDE is a massive casting having a flat and "V" way insuring continued alignment. Bearing surfaces are large and well protected. Spindle belt operates with a downward pull; an important factor in rigidity.

The chrome nickel WHEEL SPINDLE is mounted in large bearings, all adjustments of which are made at grinding wheel end through an opening in top of slide.

The MAIN DRIVE UNIT receives power from the main line by tight and loose pulleys, transmitting it directly by belt to main speed box, wheel spindle and pump.

MAIN SPEED BOX, situated on the rear of machine, furnishes power to wheel slide by a 3-step cone, and operates the chuck, which has three speeds, through a bank of gears. Wheel slide and chuck are independent of each other, permitting a large latitude in speeds and feeds.

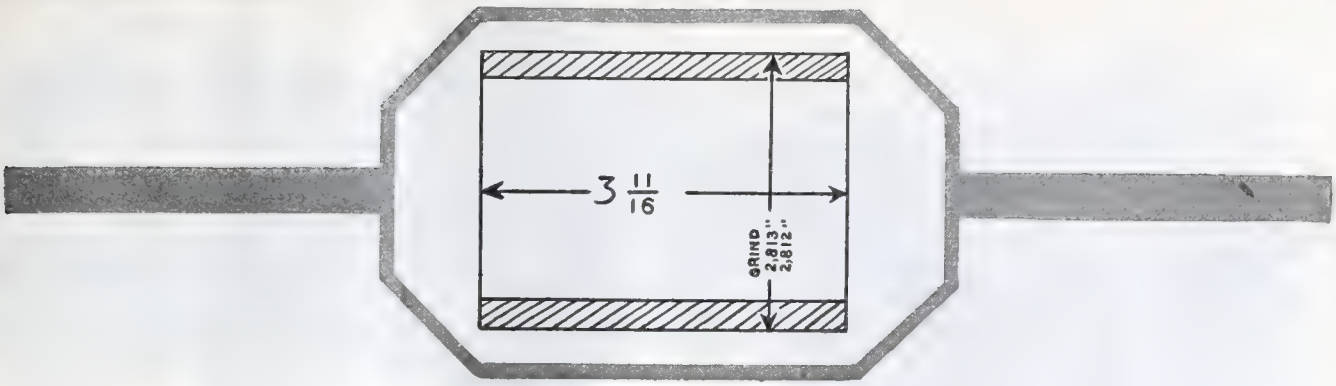
Chuck spindle is driven by spiral gears, one of which is mounted directly on the spindle. Spindle itself is mounted in a sleeve which has vertical adjustment. Upper portion rests in a taper bearing, lower end being equipped with ball bearings—wear is automatically taken up. All control levers and adjustments are within easy reach of operator.

Complete water apparatus is furnished with each machine; built in two sizes, 8" and 12", with Heald Magnetic Chucks are regular equipment. Motor drive if desired.

LET US SEND YOU SPECIFICATION AND LITERATURE

The Heald Machine Company

WORCESTER - - - - MASS.



Agricultural Machinery Manufacturers! Here's Something for You

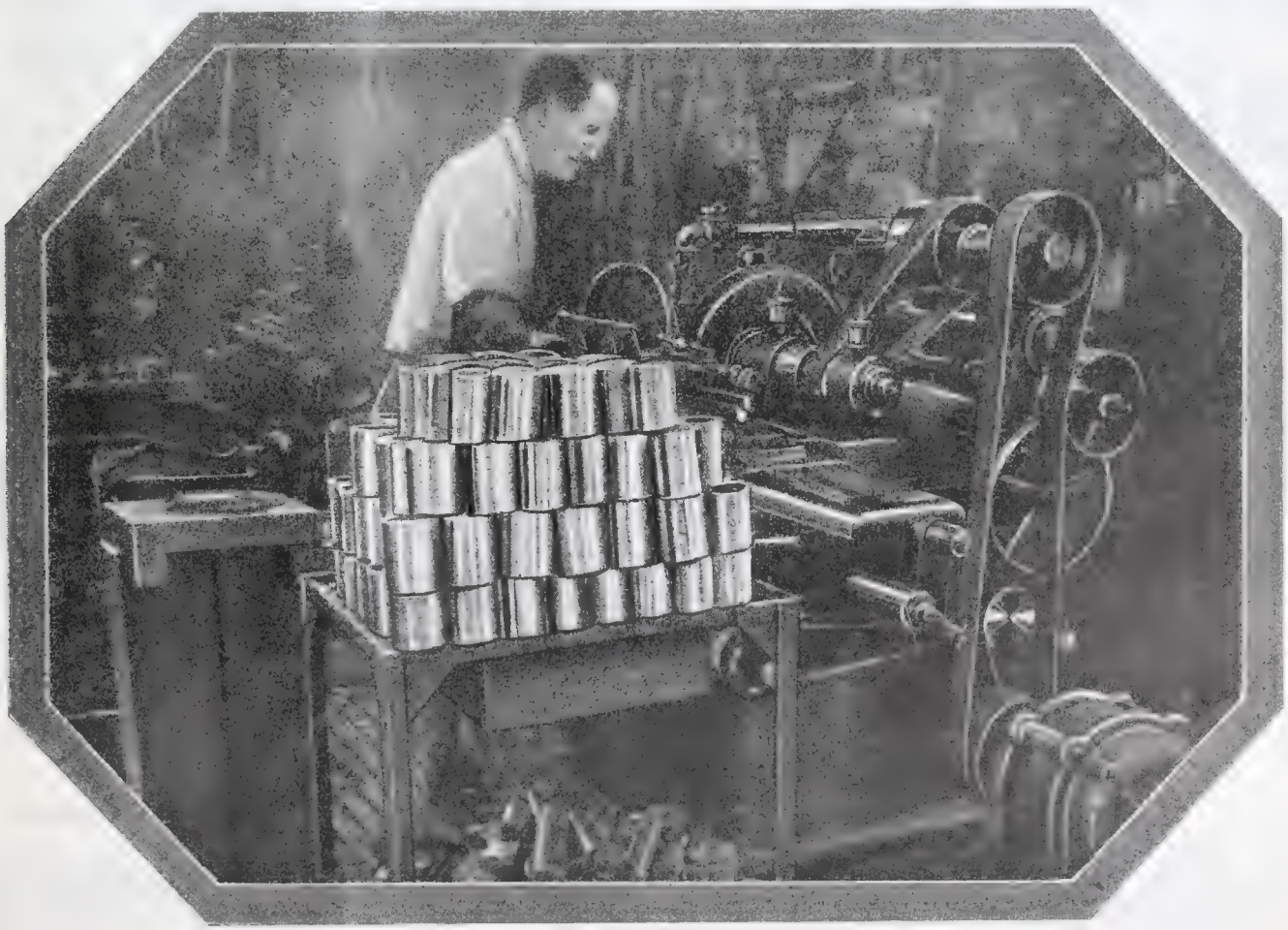
The Norton Grinding Company can help you keep down your manufacturing costs, improve the quality and finish of many of your products, and increase the output.

One of the best known agricultural machinery manufacturers uses large numbers of bronze bushings for connecting rods in a large 75-h.p. motor built by them. This concern finishes them on a 6 x 32-in. Norton Grinding Machine. The operator removes 1-32 inch stock and is allowed a tolerance of 0.001 inch. His average output is one every minute. Our Service Department will gladly furnish you with information on plain grinding. Perhaps you have work that could be done more profitably that way. Send us your blue prints.

Norton Grinding Company, Worcester, Mass.

Chicago Store, 11 North Jefferson Street

Vonnegut Machinery Company, Indianapolis, Ind. **Robinson, Cary & Sands Company,** St. Paul and Duluth, Minn. **Manning, Maxwell & Moore, Inc.,** St. Louis, Mo. **Henry Prentiss Co.,** New York, N.Y.; Boston, Mass.; Buffalo, N.Y.; Rochester, N.Y.; Syracuse, N.Y.; Scranton, Penn. **The Motch & Merryweather Machinery Company,** Cleveland, O.; Detroit, Mich.; Pittsburgh, Penn.; Cleveland, O. **Eccles & Smith Company,** San Francisco, Calif.; Los Angeles, Calif.; Portland, Ore. **The Canadian Fairbanks-Morse Company, Ltd.,** Montreal, Que.; Toronto, Ont.; Vancouver, B.C. **C. T. Patterson Company, Ltd.,** New Orleans, La. **Kemp Machinery Company,** Baltimore, Md. **W. E. Shipley Machinery Company,** Philadelphia, Penn. **English Tool & Supply Company,** Kansas City, Mo. **Alfred Herbert, Ltd.,** Coventry, Eng.; Paris, France; Milan, Italy. **The F. W. Horne Company,** Tokio, Japan. **Iznesskoff & Co.,** Petrograd, Moscow and Ekaterinburg.

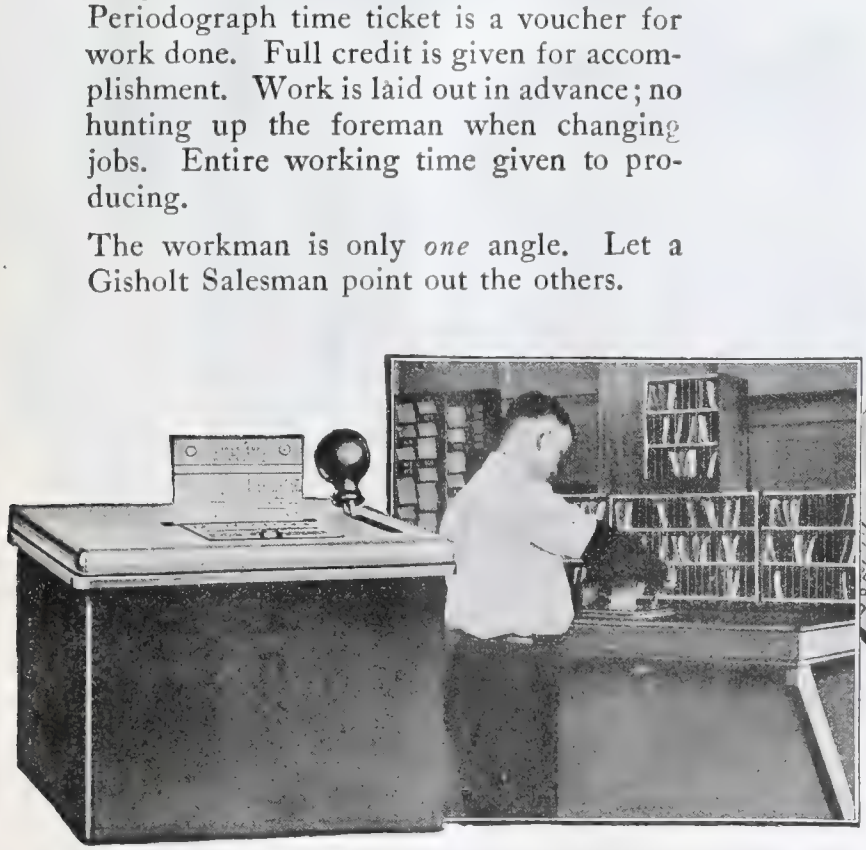


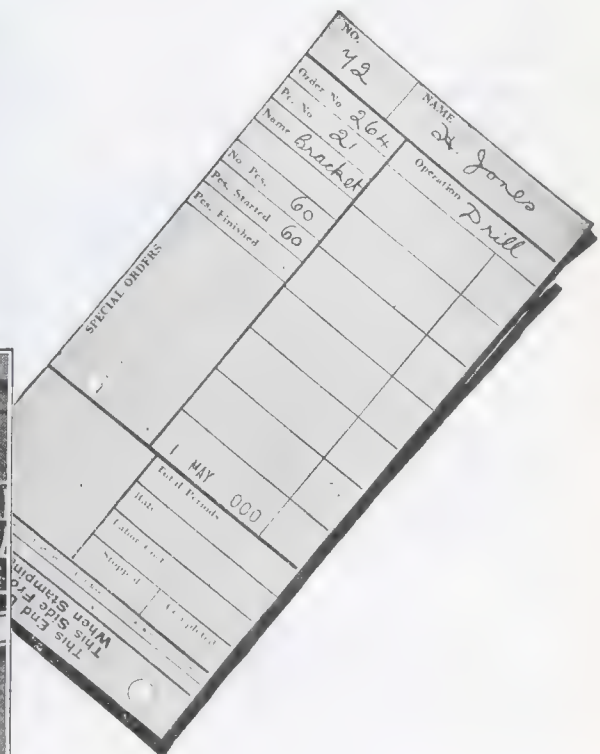
GISHOLT

WORKMEN BENEFIT THROUGH THE PERIODOGRAPH

They are relieved of clerical labor. Each Periodograph time ticket is a voucher for work done. Full credit is given for accomplishment. Work is laid out in advance; no hunting up the foreman when changing jobs. Entire working time given to producing.

The workman is only *one* angle. Let a Gisholt Salesman point out the others.





GISHOLT MACHINE CO., 1207 East Washington Ave. MADISON, WIS., U.S.A.

Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, etc.
Eastern Sales Office: 30 Church St., New York *Works:* Madison, Wis., Warren, Pa.

CANADIAN AGENTS: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria.

CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXII. No. 8 Toronto, August 21, 1919

Reducing Press Accidents by Sane Treatment

Through the Courtesy of the National Safety Council We Are Able to Present to Our Readers Photographs of Various Safety Devices on Presses Which Have Proved Most Successful

ACCIDENT records show that more injuries occur on power presses than on any other machine, except, perhaps, the circular saw. This pamphlet will discuss especially the metal-working press, or "punch press," the use of which is so rapidly increasing; but many of the principles herein described can be applied, with a little ingenuity, to similar machines in specialty manufacturing, leather working, printing and binding, soap making, and other industries.

Causes of Accidents

In practically all press accidents, the operator's fingers are caught under the ram, at the point of operation. This is due to (1) the press repeating, (2) the operator leaving his hand between the dies as the ram descends, or (3) an unexpected stroke caused by accidental tripping.

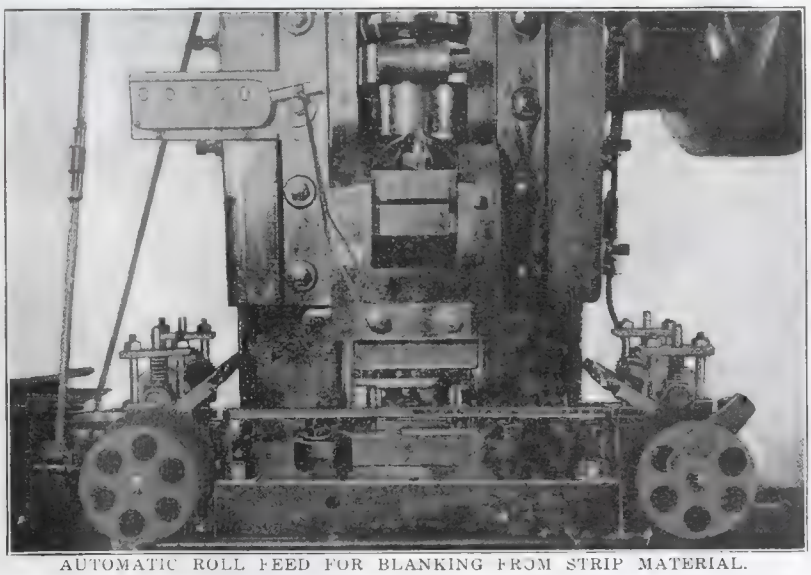
The report of the Industrial Commission of Wisconsin for the year 1917 shows that of 343 punch press accidents, 333 (or 97 per cent.) occurred at the working point, and that of 111 permanent injuries resulting from these accidents, 110, or over 99 per cent., occurred at this point.

Over 99 per cent. of the cost of these accidents, including compensation and medical attention, was chargeable to accidents occurring at the point of operation. This is convincing proof that to prevent press accidents a study of the operation of each press must be made, to eliminate, if possible, the need of the operator placing his hands between the dies; or, if this is impracticable, to install a guard which will prevent the operator's hands being caught between the dies when the ram descends.

Automatic Feed

The most effective way to remove the operating point hazard is by using an automatic feed. It is difficult to develop a satisfactory feed for some operations, but if the problem can possibly be solved, a marked increase in production (as well as safety) will result. Types of automatic feed include the following:

(a) Roll Feed. This may be used in most operations where strip metal is passed through the press for blanking. These rolls, driven by small gears, or by a belt, feed the stock through the machine, and the operator's hands need not be placed between the dies.



AUTOMATIC ROLL FEED FOR BLANKING FROM STRIP MATERIAL.

(b) Plunger Feed. The plunger pushes the work under the ram at each stroke; the operator places the work in a vertical feed chute, the plunger operating at the bottom of the chute.

(c) Chute Feed. The press is inclined; the material is placed in an inclined chute and slides by gravity under the ram.

(d) Dial Feed. The work is carried under the descending ram by a revolving dial, fed by hand or by a gravity chute.

(e) Revolving Dies. Two or more dies are constructed on a plate, which revolves at each stroke of the ram. The operator places the work in an empty die; when the die plate revolves it carries the work under the ram.

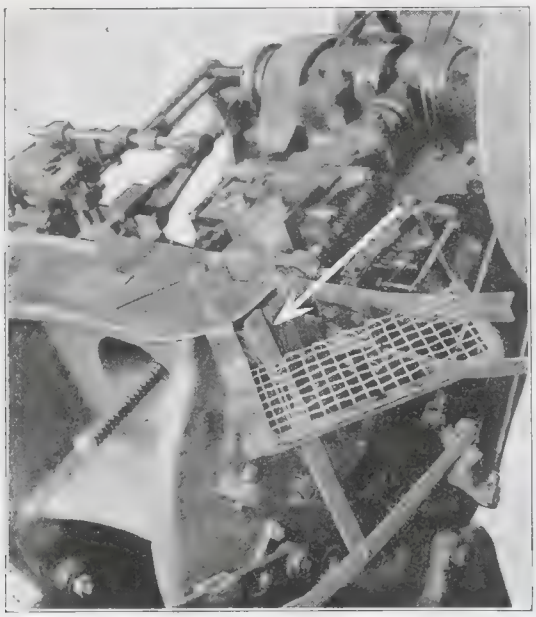
(f) Sliding Dies. Each operation slides the die from under ram. The operator loads the die, and with the down stroke the loaded diet slides back into position.

The principal hazards of an automatically fed machine occur when adjustments are being made, or when dies are being changed. If the plunger makes a stroke at such a time a serious injury may occur. Every such machine should be equipped with an automatic stop which will lock the machine whenever continuous operation is interrupted. The plunger and dies should be enclosed, if possible, to remove all danger of operator's hand being caught.

Blanking

In blanking operations, especially when hand-fed, the plunger should be enclosed at the front and both sides by a guard of wire mesh, perforated metal or wired glass, leaving just enough space under guard to admit the stock. If of a metal, the guard should contain a slot through which the operator can view his work. For hand feeding, this guard must fit the die closely; it should, therefore, be readjusted, or a separate guard provided, by the die maker or die setter whenever a new operation is put on the machine.

A telescope guard, attached to the ram,

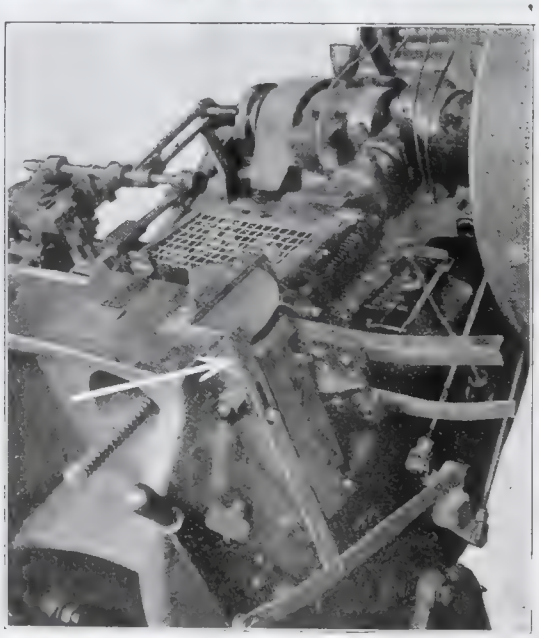


LOCKING DEVICE FOR CLUTCH OPERATING LEVER. NOTE THAT WITH GUARD OUT OF POSITION LEVER IS LOCKED SO THAT PRESS CANNOT BE STARTED.

AUTOMATIC PLUNGER FEED.

CHUTE WITH DIAL FEED. MATERIAL IS CARRIED TOWARD THE DIES BY THE REVOLVING DISC.

GRAVITY CHUTE FEED



LOCKING DEVICE FOR CLUTCH OPERATING LEVER. NOTE THAT THE GUARD IS LOCKED IN POSITION BY ROD CONNECTED TO OPERATING LEVER.

is sometimes used in place of a basket enclosure.

In large blanking operations, using long sheets of metal, the operator must ordinarily reach through the machine for the stock, unless a helper is stationed behind the machine. This hazard may be avoided, and the speed of operation increased, by the use of a vacuum pick-up controlled by the operator.

Many of the devices discussed under "Forming" may be used for blanking, but do not furnish as complete protection as a plunger enclosure.

Forming

For many forming operations an automatic feed can be devised and the plunger enclosed. With hand feeding, a fixed plunger enclosure is often impracticable. In such cases particular attention should be given to the design of dies, and in addition a device should be provided which will minimize the possibility of the operator's hand being left between dies. Each of the following types has its particular field of usefulness:

(a) A sweep bar or gate, which swings across or moves upward in front of dies, or moves across lower die, as the ram descends, and thus pushes hands out of danger. Such a guard should be operated by movement of ram, not by treadle.

(b) A swinging, sliding, dropping or expanding gate which forms a guard in front of dies before ram descends. This is operated by the treadle. If hand is in danger the gate cannot close and the treadle will not operate.

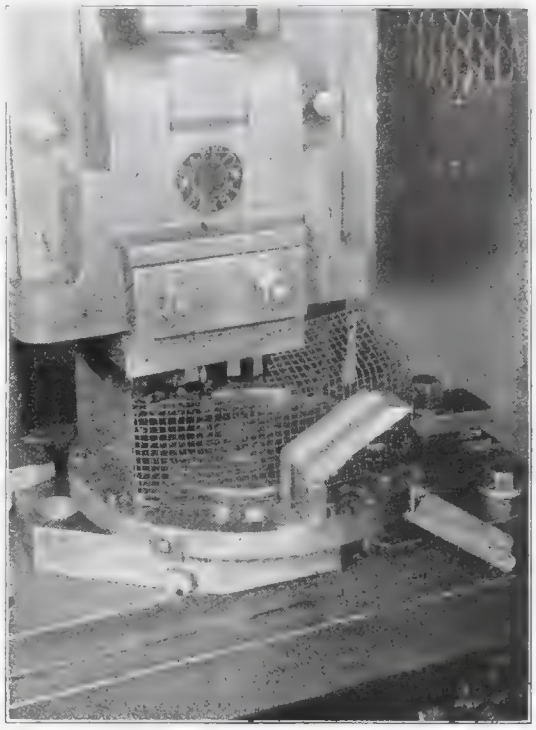
(c) A two-handed lever or push-button device which requires the use of both hands to trip the press or release the foot treadle. Where several men are employed at one large press, an electric control may be arranged with push-buttons in series, so each man must press two buttons (one with each hand) before the press will operate.

(d) Tell-tale device which warns the operator of descending ram if his hands are in danger zone. These are not positive in action because they do not remove the hands from between the dies.

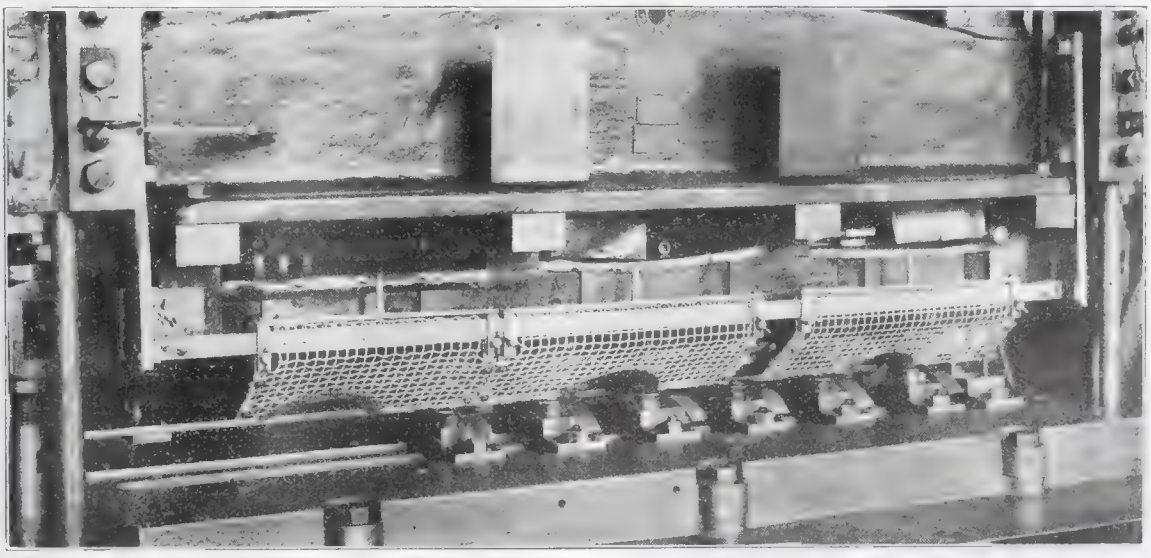
(e) Tweezers, picks, air suckers, or electro magnets, with which the material may be placed between the dies. The use of these hand-feeders frequently increases the output as well as decreasing the hazard.

Removing Stock From Press. Many accidents result from workmen's hands being caught while removing stock from press. In many operations the work is liable to adhere to the die, and a stripper or a kick-out device should be provided. A picker, or compressed air, may also be used to remove the work.

Blanking and forming are sometimes done in one stroke of the plunger; the cutting die blanks the piece and the forming die completes the operation. This double operation is often dangerous unless special methods are used to decrease the hazard.



REVOLVING DIES AND CHUTE FEED. PIECES ARE PLACED IN CHUTE, AND DROP INTO DIE, AND ARE CARRIED UNDER PLUNGER BY THE REVOLVING DIE PLATE. PIECES ARE DISCHARGED THROUGH CHUTE SHOWN BELOW PLATE.



GUARD FOR DIES FOR GANG PRESS.

Guards may be adjusted along length of supporting rod. Enough space is left for feeding material, but not enough for fingers to be placed under plungers.

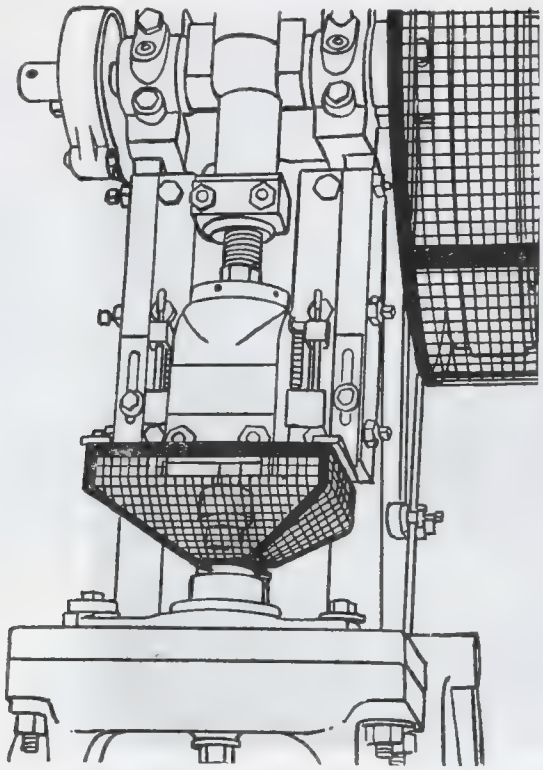
Discipline. Most of the safeguards described in paragraphs 10-12 can easily be put out of use by the operator, or can be wrongly adjusted so they will give

little or no protection. Such types of guards are valueless unless they are kept in proper adjustment and the use of them strictly enforced.

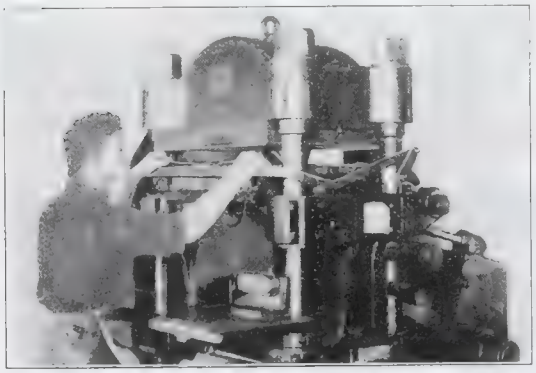
Die Making

The safeguarding of presses should begin with the design of the dies. As much study should be given to the safety of the operator as to the mechanical efficiency. Safety in press operation can only be secured by keeping the operator's hands out the danger zone. Although mechanical safeguards are designs for that purpose, practically all types of guards may be rendered ineffective by the operator or by error.

To be continued

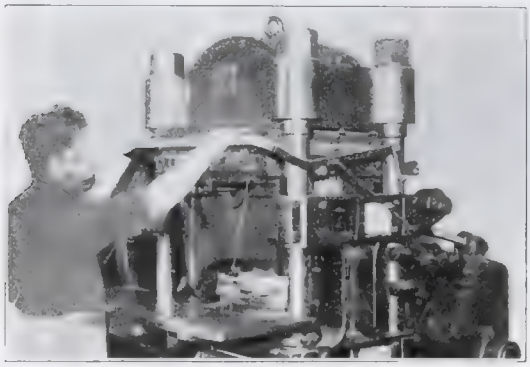


BASKET GUARD FOR BLANKING. FRONT AND BOTH SIDES ARE GUARDED. OPENING AT BOTTOM IS JUST LARGE ENOUGH FOR PLUNGER TO PASS THROUGH. THIS GUARD INCREASED PRODUCTION, SCRAP MATERIAL BEING USED.



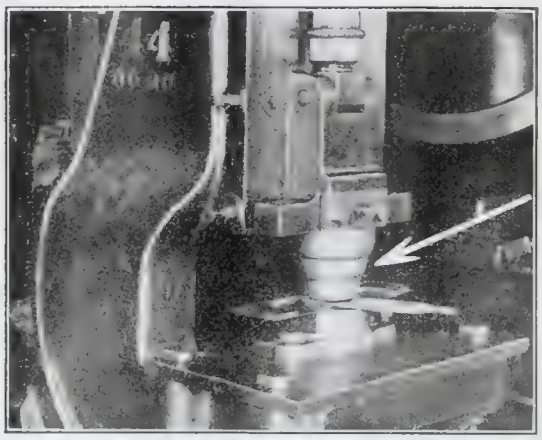
SAFEGUARD FOR STAMPING OR EMBOSSING PRESS.

Guard lies against platen and does not interfere with placing material in press.



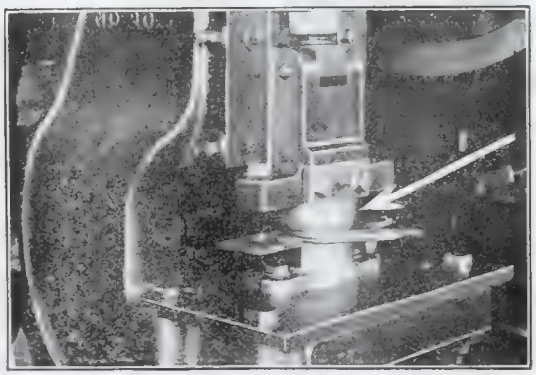
SAFEGUARD FOR STAMPING OR EMBOSSING PRESS

The upward stroke of platen, by means of two pins and a bell crank, pushes guard upward and outward, thus removing operator's hands from danger zone.

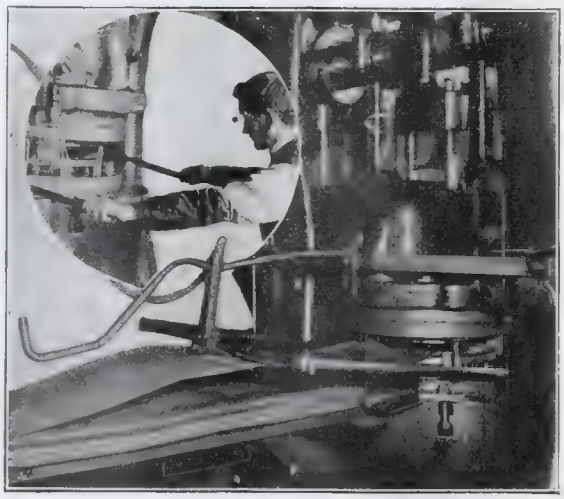


TELESCOPE GUARD.

This guard surrounds plunger and is fastened to head so that as ram descends the parts telescope one within another. At the top of stroke enough space is left for feeding stock, but not for getting fingers under guard.



TELESCOPE GUARD SHOWING RAM AT LOWEST POINT OF STROKE.



SUCTION DEVICE FOR FEEDING HEAVY SHEETS.

Operator at front of machine grasps the handles and pushes the device back on supporting rod until it comes in contact with top sheet of material. When lever controlling air valve (attached to handle) is pressed, the sucker picks up sheet and operator then pulls it toward him. (The large view shows rear of machine, with material in position for first punching.) Operator then grasps sheet by the front corners and continues to feed through machine. The use of this device has done away with need of a helper and has increased production.

Shop Arithmetic, Simple and Compound Levers

Tenth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade—Simple and Compound Levers Met in Every-Day Practice Are Discussed in This Issue

By J. H. RODGERS

IF the design and construction of machinery is traced back to its origin it will invariably be found that the elementary principle that predominates is that of the lever, in one or other of its many forms. A brief study of any piece of mechanism will readily prove this assertion. Two other fundamentals might be classed as primary factors—that is, the cord and the wedge—but these two latter are nearly always associated with that of the lever, and could well be considered incidental to the lever principle. The lever in its simplest form might be termed the pioneer machine, as man in his prehistoric state used the limb of a tree as a lever, to move the rock to and from the opening of his cave, to protect him from the perils of the outside world. In the present day the lever in itself retains all the theoretical advantages—no more or no less—that it did in the olden times, but the requirements of modern methods has compelled men to develop it to its highest state of efficiency, so that in many of the intricate mechanisms of to-day, the lever, as a common lever, has practically disappeared, especially to those unable or unwilling to observe the development of the evolution.

The lever is a bar or beam that is capable of turning about a fixed point that is called the fulcrum. The lever, commonly recognized as such, is a straight bar supported at the fulcrum, with the force applied at a relative distance from the weight and the fulcrum, so that the two former are in equilibrium. The principle, however, need not, and as a matter of fact, is not restricted to a straight bar, but may be applied in one of many forms, such as gears, pulleys and arms of any desired shape, but the underlying principles are never altered.

The three factors—apart from the lever itself—that constitute the practical application of the lever, are the fulcrum F, the power P, and the weight W; the position of the former to the latter determining their respective values and the classification of the lever. As there are three factors in the makeup, it follows that there will be three types of levers, and these are shown in the sketch below.

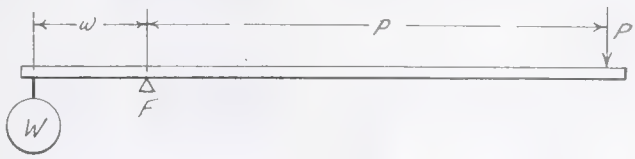
At A is shown the first form, where the fulcrum comes between the force applied and the weight supported. At B is shown the lever of the second form, where the weight is supported between the fulcrum and the force applied. The third form is shown at C, and here the power acts between the fulcrum and the weight. The classification—weight—that is generally given to any object, is the force of gravity or the attraction of the earth for that body. It is impossible to eliminate this natural force, and it is ever present in all substances, but by means of various devices, its action, apparently, may be suspended, only, however, to be transferred to another body, as the initial attraction still exists, being active through the other medium. For example, suppose a force of 100 lbs. at P, in the first form of lever, supports a weight of 100 lbs. at W; the weight is temporarily suspended, but the force of gravity still acts through the lever and the fulcrum, with the result that the downward pressure of 200 lbs. is exerted at the fulcrum F.

As stated above, the value of the power and the weight is dependent on their relative distance from the fulcrum. In working out problems involving the principle of the lever, the application of ratio and proportion is extensively used.

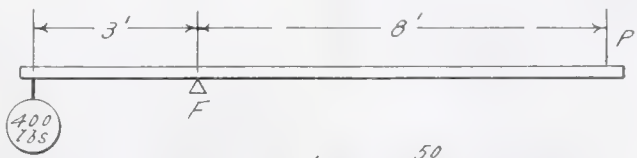
When a weight is supported on a beam or a lever, it always has a tendency to revolve about the point of support or fulcrum; this action is called the moment of the force and may be determined by multiplying the weight or force by the distance from the fulcrum. Equilibrium is attained when the force moment balances the weight moment. To lift a weight the power moment must be slightly in excess of the weight moment, but this need not be taken into account when calculating such problems in ordinary shop work.

The equation for all lever calculations may be stated as follows: Force multiplied by the force arm equals the weight multiplied by the weight arm. In the expression of a formula and using the letters as shown in the sketch, the equation would be:

$$P \times p = W \times w.$$

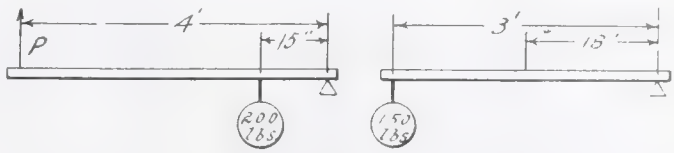


A concrete example of the above may be given. Suppose it is desired to support a weight of 400 lbs. at a distance of 3 feet from the fulcrum, and the power arm is 8 feet long, and on the opposite side of the fulcrum; what force would be required?



$$W \times w = P \times p \qquad P = \frac{W \times w}{p} = \frac{400 \times 3}{8} = 150 \text{ lbs}$$

The solution for the second form of lever is similar to the first, and the advantage is practically the same, the difference being that the force acts in the opposite direction to the weight—upwards. In the third form the action is the same as the second, but the mechanical advantage is lessened owing to the



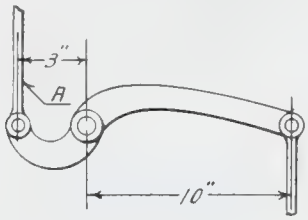
$$P = \frac{W \times w}{p} = \frac{200 \times 15}{4 \times 12} = \frac{125}{2} = 62\tfrac{1}{2} \text{ lbs}$$

$$P = \frac{W \times w}{p} = \frac{150 \times 3 \times 12}{18} = 300 \text{ lbs}$$

fact that the power applied must be greater than the weight supported. Below are examples of the two latter forms of simple levers.

It will be seen from the above that, when the power acts between the weight and the fulcrum it must be greater than the weight; therefore, for general purposes, the efficiency of such an arrangement must necessarily be considerably less than the levers of the first and second orders.

In the examples that have just been given, only straight beams have been considered, but it is seldom that these ideal conditions will occur in practice, and in many instances it is not advisable that they should. The fundamental principles, however, are the same in every particular; and that is, that calculations for the different moments must be made on the 90 degree basis, where the arm length is taken as the perpendicular distance from the direction of the pull or force applied to the point of support. The principal objects of irregular shaped levers is to avoid interference with other parts of the mechanism when in motion; sometimes the shapes are designed for appearance only.



The above sketch shows a type of lever that is frequently met with in machinery, and in this particular case the primary factor is the movement of the ends to operate slides or valve spindles. In the example here given it is required to find the throw of an eccentric or the lift of a cam, operated on the long arm, to give a vertical movement of 1⅜ inches to the rod A. To the right is shown a skeleton drawing of the centre lines of the lever, and the arc passed through in making the cycle. To find, by calculation, the required throw, use the principle of proportion as explained in a previous lesson.

$$3 : 10 = 1\tfrac{3}{8} : x$$

$$x = \frac{10 \times 1\frac{3}{8}}{3} = \frac{\overset{5}{\cancel{10}} \times 11}{3 \times \underset{4}{\cancel{8}}} = \frac{55}{12} = 4.58 \text{ in.}$$

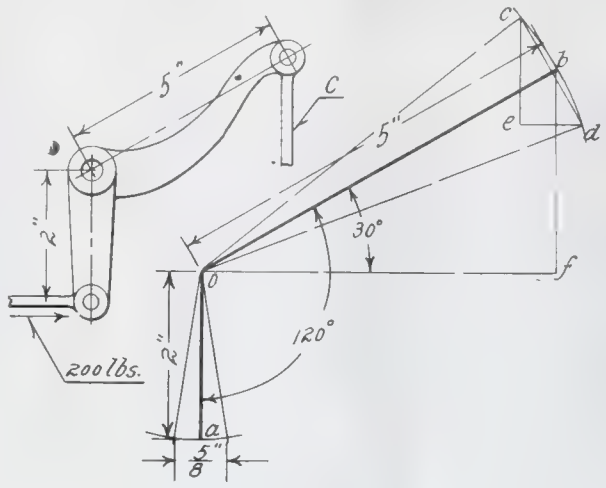
It often happens that a lever may be placed in a position that a direct right angle pull is impossible.

In the sketch shown the rod B is to have a movement of 5-8 of an inch, and is to overcome a resistance of 200 lbs. With the dimensions given, what will be the vertical movement of the rod C, and the force required to overcome the pressure acting at B? The length of the chord c-d, at the extremity of the long arm, can be found by proportion, thus:

$$\frac{5}{8} : c\text{-}d = 2 : 5$$

$$c\text{-}d = \frac{\frac{5}{8} \times 5}{2} = \frac{5}{8} \times \frac{5}{2} = \frac{25}{16} = 1\tfrac{9}{16} \text{ inches.}$$

It will be seen, however, that the upper end of the vertical power rod C will travel through the arc c-b-d, but due to the inclination of the arm at the angle of 30 degrees to the horizontal, the



throw of the crank at the lower end of the rod C will only require to equal the length c-e of the right triangle c-e-d. This length may be found by "trig" and

the rule to apply would be: Side adjacent equals hypotenuse multiplied by cosine, or:

$$\text{Side Adj.} = \text{Hypot.} \times \cos. = c\text{-}e = (c\text{-}d) \times \cos. 30$$

$$c\text{-}e = 1\tfrac{9}{16} \times .866 = 1.353 \text{ inches.}$$

As b-f is the direction of the power pull the moment for the power arm must be found by multiplying the power applied by the length of the line o-f, perpendicular to the line b-f. This length can be determined by the formula:

$$\text{Side Adj.} = \text{Hypot.} \times \cos. = 5 \times .866 = 4.33 \text{ in.}$$

Then the power required to overcome the resistance of 200 lbs. at the short end of the bell crank would be:

$$2 : 4.33 = x : 200 \quad \text{or}$$

$$x = \frac{2 \times 200}{4.33} = \frac{400}{4.33} = 92.4 \text{ lbs.}$$

FORD-SMITH MILLING MACHINES

Unfortunately our composing room dept. made a rather peculiar error on page 10 in advertising section of our Aug. 7th issue.

This referred to the Ford-Smith Machine Co., Ltd., of Hamilton, Canada, who are well known for their line of milling machines.

The advertisement was made to read "Mining Machines" in place of "Milling Machines."

The corrected advertisement appears on page 74 of this issue.

The earliest known mention of cigars is in a book published in 1740 under the title of "Distresses and Adventures of John Cockburn." It appears that Cockburn was cast on a desert island in the Bay of Honduras, from which he swam to the mainland, and thence travelled afoot to Porto Bello, a distance of 2,600 miles. Here he met some friars, who gave him some "seegars" to smoke. "These," he says, "are some leaves of tobacco rolled up in some manner that serves both as pipe and the tobacco itself." Though this is the earliest date at which cigars appears to be mentioned by that name, so far back as 1498 two soldiers sent by Christopher Columbus to explore Cuba told their companions on their return how the natives carried in their mouths a lighted firebrand made from the leaves of a certain herb, rolled up in maize leaves. The description of an Indian method of smoking given by Lionel Wafer, in his "Travels in the Isthmus of Darien," in 1699, shows that they then smoked cigars made just as they are made now.

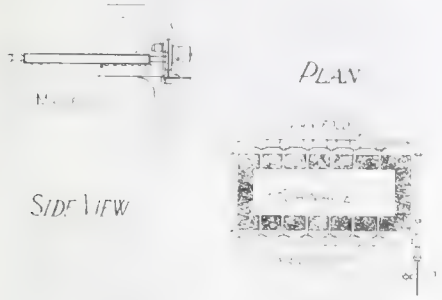
A Combination Gas or Electric Blow Torch

With an Improvised Furnace, of Ordinary Firebrick, You Can Produce the Same Results as With a High Temperature Furnace. That is—if You Use a Torch as Herein Described

By FRANK C. PERKINS

THE accompanying illustration, Fig. 1, and drawings, Figs. and 3, show the operation of a gas-electric blow-torch, developed at Cleveland, O. It is stated that with an improvised furnace of ordinary firebrick, using the gas-electric blow torch, one can produce the same results as with a high temperature furnace—and at only a fraction of the cost. It requires neither engine, compressor, nor any special alteration of equipment. It is self-contained, requiring only connection with the electric light socket and the gas line, to produce a clean, even temperature up to 2,500 degrees Fahrenheit.

It is pointed out that it takes only a minute to put the blow torch into operation as it is only necessary to turn on the current, light the gas, and it is ready. It is instantly adjusted to any position or angle, and it can be carried anywhere in one hand. The cost of operation is only from five to ten cents per hour, and the intense heat produces results in time and money saving almost beyond computation. There is practically no machine shop, blacksmith shop, automobile repair shop, welding shop, or factory where metals are used and heat is required that a gas-electric blow torch cannot be used to advantage. It is convenient, economical, and most satisfactory as a heating equipment for hardening (including high-speed steel), tempering, annealing, forging, brazing, making shrink fits, pre-heating for acetylene welding, babbitting, removing

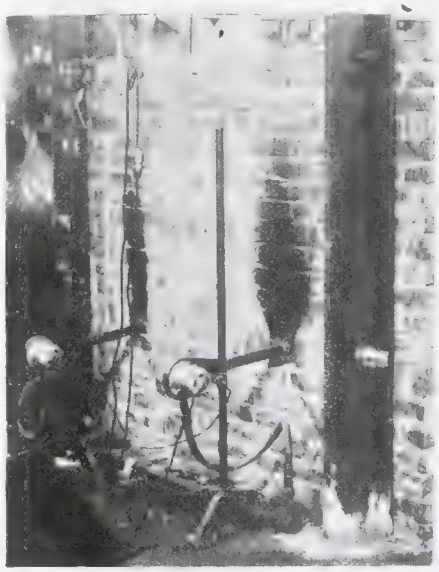


OTHER VIEWS OF FURNACE.

babbit from bearings, melting various metals, also for making pattern castings, straightening bars, shafts, frames, axles, crank shafts in centre, and bending tubing and heating rivets.

It is used to advantage for hard soldering, fitting boiler patches, skin drying, molds, heating core ovens, repairing tools, drying cores, repairing patterns gates, riveting frames, housings and spindles, also for removing old insulations from stators, armatures and soldering large commutators, removing pulleys.

It is claimed that one of these burners has been developed which is extremely useful for small soldering jobs—for brazing or for heating parts in inaccessible places, and it can be either attached to the regular burner or can be made extremely flexible by using the reducer,



ILLUSTRATING THE IDEA, AND INSTALLATION.

as illustrated, and a short length of hose. The maximum flame length is about 10 inches, the diameter 1½ inches at its largest point. The minimum flame length is three inches, with a diameter of one inch, tapered to a cone. The maximum gas consumption is 52 cubic feet per hour with natural gas, and 70 cubic feet per hour with artificial gas. The minimum gas consumption is 18 cubic feet per hour with natural gas and 25 cubic feet per hour with illuminating gas.

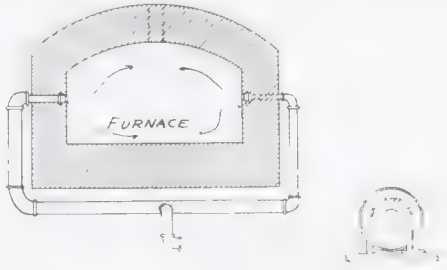
Another blow torch attachment has been designed which gives the same satisfactory results when used for small hardening or melting furnaces. The reason for using this attachment is to prevent the burning of the nozzle when it is inserted into the furnace. Gas is protected into the furnace and does not burn on end of nozzle. Changing from the blow torch to the furnace burner can be done in a moment by simply slipping the one off and the other on.

The oil-electric blow torch operates with the same high efficiency as the gas-electric torch, the only difference being its ability to burn kerosene. This oil-electric blow torch is fitted with a specially designed kerosene oil burner. This burner operates on the atomizing principle, but is also fitted with a vaporizing coil to gasify the fuel after the burner has been in operation long enough to heat the coil.

The particular feature of the oil-electric blow torch is that it will light instantly without pre-heating. It produces a clear luminous flame of approximately the same temperature as the gas-electric torch. Its range of control is excellent—furnishing a maximum flame length of about 24 inches with a diameter of 5 inches at its largest point.

The electric blow torch will also burn either natural or artificial gas successfully and is fitted with a gas control cock the same as the gas-electric. Thus this torch is really universal. It can be used in the city for the many heating and repairing jobs to which it is adaptable, and it can be easily transported to the country or to any district where there is no gas, and used with oil. The maximum kerosene oil consumption of the oil-electric blow torch is approximately 2½ gallons per hour—the minimum 1½ gallons per hour.

The gas-electric blow torch has a blower of extremely substantial construction, which will operate continuously for practically any length of time, due to the fact that over-heating of the motor is absolutely prevented by the air entering the blower which must first pass around the motor before entering the fan chamber. The gas enters through the opposite side, and the mixture of air and gas is made perfect by



SECTION THROUGH FURNACE.

the rapidly-revolving fan. When the mixture leaves the fan chamber it is a perfectly homogeneous mixture of air and gas of the most combustible nature. Both the volume of air entering the blower housing and the supply of gas is under instant control. The motor is entirely enclosed to prevent dirt or dust getting in contact with the bearings and other moving parts, and the constant cooling blast of air keeps it in perfect running condition.

The Various Mechanical Properties of Steel

Taking Up the Consideration of the Question of Brittleness, Together With Investigation of Failures of Various Kinds. A Paper of This Nature on Steel is Especially Valuable at the Present Time

By W. H. HATFIELD, D. Met. of the Brown-Firth Research Laboratory, Sheffield, Associate Member

(Continued from last issue)

IN a recent paper previously referred to, Rosenhain and Hanson describe an investigation into the cause of cracking in a thick boiler plate. The failure examined occurred in the last stage of manufacture, that is, cracking during cold bending. The authors present interesting data, and the results of subsidiary experiments bearing upon the case. They deduce that the cause of failure lay in the growth of large crystals in the ferritic bands, claiming such crystalline growth to be responsible for the low impact value of the material, and that the low impact value of the material was an indication of the mechanical properties which produced failure. The processes through which this particular plate had passed were those through which other plates had passed which had not cracked, and the author's conclusions would have been more convincing if they had definitely shown that successful plates had not possessed the same features which they condemned in the plate which had failed. One would rather suspect that the breakage of this plate was due to the presence of mechanical defects or the production of small incipient flaws by over-bending in the cold. Unfortunately, the stages of bending are not published. The author discusses this paper now, since it has a direct bearing upon the technical points which he hopes to bring forward later.

Another well-investigated failure is that of the St. Neots rail. This failure was the subject of a Board of Trade Inquiry. It has also been dealt with by Dr. Arnold, F.R.S.; Dr. Stead, F.R.S., and others. Here we have an extremely valuable instance of a failure with many well-authenticated details. The rail was 22 years old, and it had worn down 5-16 in. under traffic abrasion; it then subsequently smashed into a number of pieces, causing the well-known disaster. One eminent investigator states that thousands of rails of worse composition had served satisfactorily. The mechanical properties, as shown by the tensile tests, were good. One extremely important feature, however, seems to be that the upper surface of the rail consisted in many parts of a martensitic layer (layer of hardened steel). This layer contained thousands of hair cracks. Such a martensitic layer may conceivably have been produced by abnormal effect of the brakes, and such a layer would yield the minute cracks just described under subsequent usage. The main points that it is wished to record are:

1. The original satisfactory condition of the rail as proved by the satisfactory behaviour over 22 years.
2. Its mechanical condition.
3. The presence of surface cracks.

Leaving this case for the present it is proposed to describe an interesting case which recently came to the author for investigation. He was informed of a case in which a piece of structural steel (angle-iron) made from shell discard, had broken sharply in two with a blow from a 14-lb. hammer. The fracture is illustrated in Fig. 1, page . He was incidentally informed that this occurrence had raised grave doubts in the minds of the firm concerned with regard to the advisability of the extended use of such material. In due course the pieces came into his hands, and an investigation was entered into with considerable enthusiasm, as here indeed was apparently an instance of really brittle steel. In the first place the chemical composition of the material was determined, and it was immediately found that the steel was not shell discard but low-carbon structural steel. That discovery, in itself, as will be appreciated, was quite an important one when present circumstances are considered. The figures obtained in the analysis were as follows:

	Per Cent.
Carbon	0.09
Manganese	0.65
Silicon	0.017
Sulphur	0.038
Phosphorus	0.061
Tungsten	Nil
Chromium	Nil
Nickel	Nil
Vanadium	Nil
Titanium	Nil

Microsections were prepared and the microstructure of the steel studied. In Fig. 2 will be found a photograph of the unetched structure which gives an idea of the amount of non-metallic inclusions present. There is, of course, always more or less of this non-metallic matter in these structural steels, and its layout is always parallel to the direction of rolling; hence in this particular instance the inclusions were in path at right angles to the fracture. In Fig. 3 will be found the etched structure at 100 diameters and the amount of pearlite, together with the size of crystal, can be studied. In Fig. 4 will be found the microstructure of the material at 500 diameters, and this particular photomicrograph enables the condition of the pearlite to be examined. The author did not consider that the micro-examination brought out anything abnormal, but found that it confirmed the results of analysis.

The mechanical properties of the material were next studied in proximity to the fracture. The tensile values, includ-

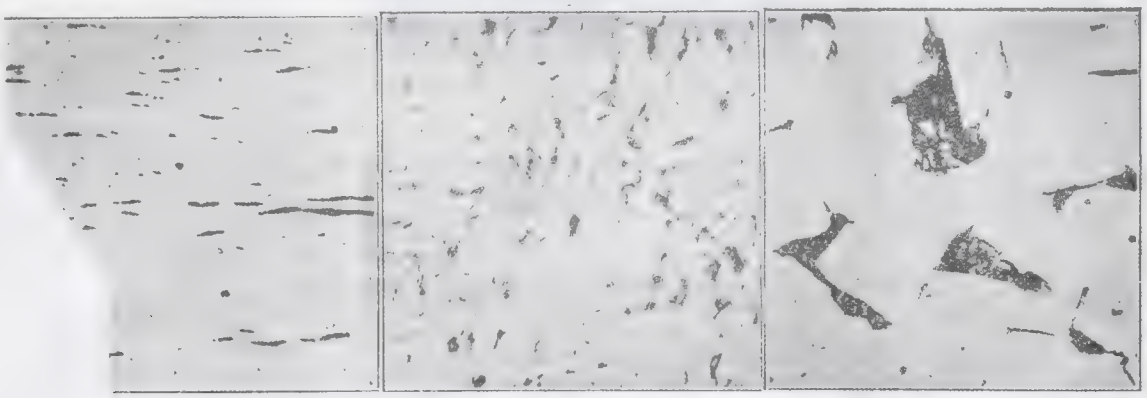


FIG. 2 UNETCHED ×100 DIAM. FIG. 3 × 100 DIAM. ETCHED. FIG. 4 × 500 DIAM.

ing the elastic limit (limit of proportionality) were determined, and then the different values were obtained under the Arnold, Charpy, Izod, Fremont, Sankey, and Stanton tests. The hardness was determined by both the Brinell and Shore methods; the results will be found in the following table, whilst the full details of the actual tests will be found in Appendix I:

Tensile—	
Elastic limit	15.9
Yield-point	20.9
Maximum stress	29.4
Elongation of area	30.0
Reduction of area	61.9
Alternating Impact, etc.—	
Arnold alternating-stress test	211 reversals.
Charpy impac ttest	2.9 kgm. or 20 ft.-lb.
Izod	50 ft.-lb.
Frémont	23 kgm. 90 deg.
Sankey Alternating-bend test	33 bends 2,320 ft.-lb.
Stanton repeated-blow test	635
Harness	
Brinell hardness number..	120
Shore Scleroscope number.	20.5

It is considered that these values are of much interest. In the first place, the Arnold and Sankey tests give too good values for the steel to be considered brittle. The Charpy, Izod, and Fremont gives values which must be considered very good, therefore the steel is not brittle under the notched-bar tests. For 28 tons to 32 tons steel the tensile values must be considered quite satisfactory. Why, therefore, should this angle-iron of good composition, microstructure, and mechanical tests break with a single blow from a 14-lb. hammer? The explanation appeared to be forthcoming as a result of a careful examination of the fracture. At the point marked by the arrow there was a discoloration indicating a sharp, already-existing crack of small area. The author considers that this crack led to an undue concentration of stress, and that, in spite of the good qualities of the material, fracture extended right through the piece in the manner described. Continued observations, both in this country and abroad, have readily and finally established that the sharpness of a notch or the gradually decreasing value of the radius at the bottom of the notch, accentuates its effect in reducing the amount of energy absorbed in destroying an impact test-piece. It is now firmly established that the stresses become increasingly great locally to a notch according to its sharpness. Professor Hopkinson, in one of his papers has observed quite truly that if the bottom of the notch or crack were infinitely sharp, this concentration of stress would cause the production by a small force of a high local stress at the base of a notch or crack sufficient to exceed the strength of the material and cause a continued propagation and development of fracture. In other words, failure such as occurred in this piece of structural steel, in some of the cases of boiler plate failures and, in the author's opinion, in the St. Neots rail, have been due to existing cracks of considerable "sharpness," which have, by their creation of unduly high local stress, exaggerated abnormally the work which the material was locally called upon to do. Impact values may vary considerably in a given steel, but a high impact steel as already shown, is not impervious to disastrous failure under conditions such as those just discussed.

It will be noted in the case of this piece of structural steel just described that the Stanton value is low. In a 60-tons tensile steel values of 6,000 to 8,000 blows are obtained. In this particular instance the energy of blow was exactly the same, and the low value is explained by the low elastic limit. It will be observed that this low value (Stanton) was obtained in spite of a high notched-test value. The general argument for the utility of the notched impact (single-blow) test usually relies on the claim that through inadvertence or design, sharp corners, notches, defects, even cracks have to be counted under actual service conditions.

Surveying notched-bar, impact and "fatigue" tests generally, the author considers that one definite fact is apparent, namely, fatigue tests with notches, such as the Stanton test, do not show any relationship to the impact values. For instance, two high-tension steels of a suitable elastic limit otherwise identical, one giving 50 ft.-lb. under the Izod, whilst another gives 8 ft.-lb., will be found not to show anw disparity under Stanton test, both breaking under that form of test at something like 7,000 blows. As an instance of actual observations made, the diagram shown in Fig. 5 is instructive. There will be found the results of tests on six 60 tons to 65 tons steels. The full tensile values, together with the Stanton, Izod and Charpy values were obtained. It is clear that everything else being equal, the incipient cracking prior to rupture of the material occurring at the notch of the Stanton test-piece should, on the above argument, have been prevented from developing by the high impact value of the material, thus providing a discrimination. To the author's mind it would appear that the inference to be drawn from this and other data which will be provided later, is that once the elastic range has been passed, final rupture cannot be prevented by variations in impact value. Hence arises the fundamental importance of thoroughly considering the distribution of stress and the providing of a sufficient factor of safety in relation to elastic range.

A Discussion of the Methods Employed For Mechanical Testing

As regards the tests now in use for the mechanical testing of steels and irons, it may be safely said that each provides information of value. This may be stated without excepting any individual test. How are we to judge the relative value of the diverse means of testing from the engineers' point of view? It would appear that those tests are most instructive concerning the ultimate behaviour of the steel, which nearest approximate to, or reproduce, the conditions under which the steel has to serve. The tensile and torsion tests are of particular value, and in most cases clearly give a direct indication as to the suitability of the material. Particularly useful for purposes of design is a more complete knowledge of the elastic range under these two forms of test. Until more ready means of determining the limit of proportionality in the tensile test than the present-day extensometer can be obtained, such determinations cannot become routine tests, but the engineer might usefully obtain sufficient number of such readings to assist him in more accurately calculating his safe ranges of stress.

As regards the tensile test we have much to learn, and investigations such as those which have of late been pursued by Professor Dalby, F.R.S., are invaluable. He and other workers have advantageously shown the value of the detailed study of even our most commonly employed tests.

(To be continued)

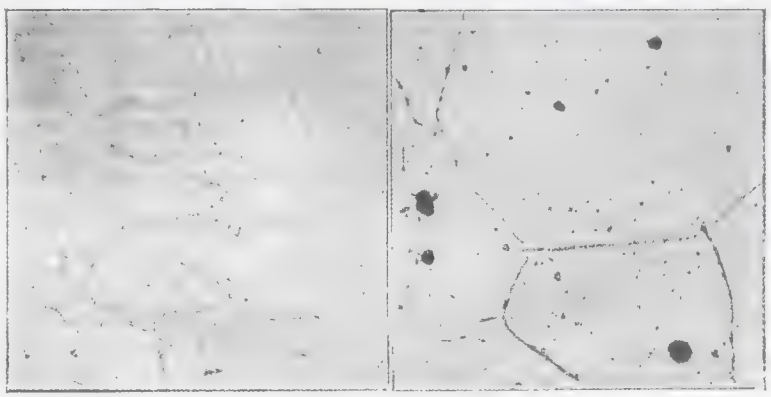


FIG. 6.—WROUGHT IRON AS RECEIVED x 100 DIAM. ETCHED x 500 DIAM.

In the slang of the United States, a "dago" is any dark-skinned foreigner from Southern Europe or Spanish America, especially an Italian, a Spaniard, or a Portuguese. In his "Life of Commodore Perry" (the American naval officer who opened Japan to commerce in 1852), Dr. William Eliot Griffis says: "In Spanish America 'Santiago,' 'San Diego,' 'Iago,' and 'Diego,' are such frequently recurring vocables that the Yankee sailors call natives of these countries 'Dago men,' or 'Diegos.'"

WHAT OUR READERS THINK AND DO

When is a Parting Tool Not a Parting Tool?

On July 17th We Published Mr. Ernest's Views on the Subject of Parting Tools. Here Are Two More, With Still More to Follow. Have You Sent in Your Idea Yet?

CUTTING-OFF IDEAS

Of S. G. Macklin

Regarding cutting-off tool discussion, I wish to continue where Mr. Ernest left off.

Having called your attention to the importance of a level bottom to the tool and proper side and end clearances, which have been well determined and can be obtained from any chart, let me suggest that the top rake and cutting edge can be made to suit various conditions.

The tool as made by the tool grinder is usually left level and square on the top.

Now, any tool which has been used a long time turning high carbon steel will have a little pit behind the cutting edge, proving that the flow of metal is decidedly tangent to the diameter. Now, this square cutting edge is on the same plane as a horizontal centre line, whereas the flow of metal being tangent must be so to a perpendicular one.

To accommodate this condition is the first consideration, for it is evident that the metal will pile up on the tool until there is sufficient pressure to compel it to change its direction of travel. The conclusion we have now reached being that we must grind a slight curve as our means of creating favorable conditions. Observation of this one point will be the best guide.

We now have a tool that will offer the least resistance to the metal, and if we can insure the chip being of less width than the groove we wish it to pass out of, we can cut for months and not worry much.

When the metal meets the resistance of the tool there is as great a tendency to overcome this resistance sideways as endways. I mean that the chip has a natural tendency to spread.

We will grind our tool, not square across the end, but ever so slightly rounding. This gives the chip a natural tendency to curl its edges and make it narrower than the space cut.

It is this one thing more than any other that makes the difference between a good tool and another one on the same piece of stock.

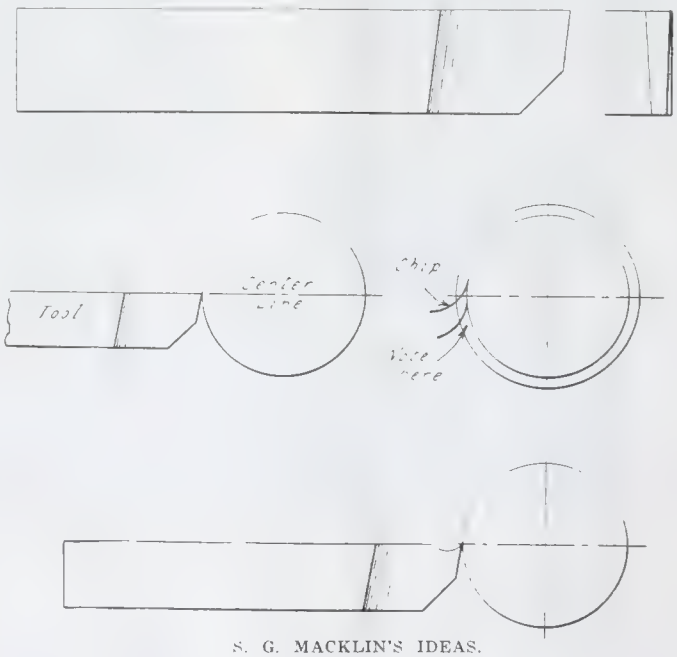
Many young fellows who think that cutting off stock is an art, that one has to be born with the know-how and so on, will realize that after many tries and careful grindings the cut-off tool got their goat, and with their patience all gone and a feeling of madness and despair, they grind again with a to-hell-with-it feeling, and the thing worked fine.

I offer this last as a suggestion that it is not the swearing that helps the job, but the ever so slightly rounding cutting edge.

The proof of these theories can be found in every-day practice.

If it is not so the metal on the sides of the cut will pinch and bind just as a board does on a rip saw.

But there are ways of using and keeping such a tool. The ideal cutting-off tool is the forged one with clearance below the top face and its clearance behind the point. Unfortunately this makes a weaker section where the stress is greatest. And workmen are prone to grind this forged tool on the top face, so that very soon it ceases to be the thing we so proudly forged, and gets shoved aside, the workmen meanwhile hunting for a better tool and growling about the "poor tools they have in this shop." It is difficult to reforge a tool so misused. The best way is to cut off the remaining part of the blade entirely and begin anew. The writer likes such forged tools and has been able to get the maximum of life from them when used personally, although the cost of the forged tool is almost as great as the inserted blade type, but prefers the latter style for all-round shop use.



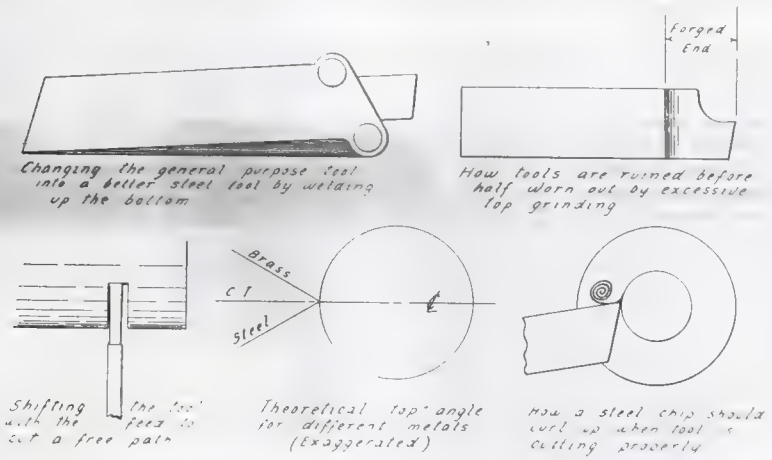
S. G. MACKLIN'S IDEAS.

CUTTING-OFF TOOL DISCUSSION

By Donald A. Hampson

The point that any cutting-off tool or parting tool must be wider at the extreme end than back of it is well taken.

A careful observer will have noticed that any tool cuts small when dull, and practically all tools will cut a path slightly in excess of their own width when sharp. So it is with the parting tool. If the edge is dull, ad particularly if the two corners get worn a bit, the tool will pinch and tear. More frequent touching on the front and less heavy grinding after it gets dull will be far better for the work. As it is hard to keep up the sharp corners in everyday hustle, some men grind them off into a 45 degree bevel of about a sixty-fourth in length. This seems to work well.



DONALD H HAMPSON'S IDEAS

Much of the work that is cut off has to be faced again or the end surface does not have to be particular anyway. A trick that will speed up this work remarkably is to cut a swath say a thirty-second wider than the tool by moving the carriage back and forth that much as the feeding-in takes place. This keeps a clearance on the tool at all times and permits a much higher rate of feeding. Moreover, the sides of the cut will look fully as good as the one where the tool got stuck and broke once or twice. This simple trick was passed along to the writer in Uncle Sam's country a number of years ago, by "a man from Canada," and it has been worth money to know it.

Many men make a mistake by overfeeding at the start. On a job of large diameter or a rough casting, they shove the tool in so hard or else have the lathe running so fast that the edge goes off on the first revolution. Thereafter they have trouble with the tool and consider themselves lucky if they get through the piece without a break. If the scale had first been ground off or cut away with another tool the cut would have been started correctly and under no handicap. A slower speed with patience is usually the "make haste slowly" of cutting off.

With tools of the Armstrong variety, the forging expense is entirely avoided and a well-shaped tool provided at the start. Mr. Ernest's trick of swelling the end of the blade to make a wider cut is good but the writer has seldon seen blades soft enough to do this. It will be found, however, that the necessary clearance is provided in most cases by keeping a sharp front edge and by cleaning the sides of the blade of the scale and black from hardening. Another advantage of this kind of tool is that almost any poor fist of a workman can sharpen it.

Poorly fitted and badly worn surfaces on the lathe are a source of trouble, but a free-cutting tool will make them less troublesome. Oil or compound of steel should be applied so it reaches the cutting edge; a drop there is better than a can spilled over the lathe, and then with a sharp tool, properly set, the chips will curl out with that peculiar hiss so welcome to the machinist.

Causes of tool breakage, other than already mentioned, are too much clearance on the front of the tool (which takes away the bearing and allows the tool to feed in too easily and too fast) and lack of rake on the top surface (which makes the tool grind and push the metal off instead of shearing it). True, the top of the tool may be ground at an angle forming a "lip," but as mentioned with the forged tool, this soon makes a great deal more grinding necessary or the reshaping of the tool.

The writer has bettered the standard tool holders in this respect by welding up the bottom full from heel to the screw boss. By so doing the blade is permanently fixed at an angle of about 7 deg. and an improved cutter for steel is thus arranged. It works well on cast iron, too.

Before hardening forged tools they should be set up on a planed surface and checked for clearance from the top down. If they don't show up correct in such a test with a square they should be ground or cut off in the shaper until they do. And a test for decreasing thickness back of the point should be made. It is often easier to correct defects here by filing than to do it with the wheel after the tool is hard.

A good way to ease up on the cutting-off tool on deep work follows. Suppose the cut is 2 in. deep; then, instead of setting the blade out two inches from the holder set it only one inch and cut that much with the stronger, stiffer tool. Set the tool out another half inch and cut that far. Finally cut the last half inch only with the weak tool.

Very often a parting tool is used full depth on a job that has a portion of the cut turned away afterwards. A better way is to do the other work first (as for instance, chamfering the heads of two bolts made together) and then cut off with the blade through the short section, avoiding the long cut and the tendency to rub on the sides.

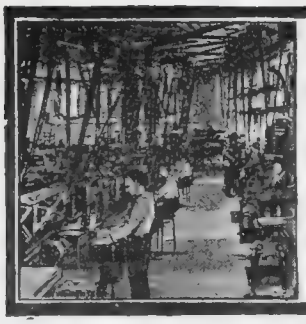
Much of the trouble with such tools comes from not being properly set. They must be set with sides parallel to the cross feed or with equal side clearance to prevent crowding to one side with the attending crooked cut and broken blade.

Eggs are reported to be selling in some Russian cities at the equivalent of $5.10 apiece in currency. Russian currency is made by the process of running slips of paper through a printing machine. A good egg should be worth a lot of it.

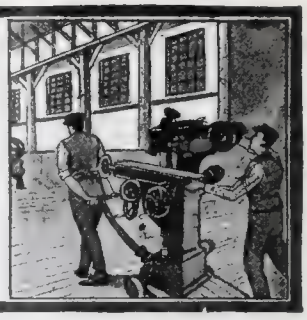
After a survey of conditions the country over, the National Industrial Conference Board announced that the cost of living for American wage earners was 71 per cent. higher in July, 1919, than at the outbreak of the world war in July, 1914. This was said to represent an advance of 6 per cent. since March, 1919, and of 12 per cent. since June, 1918. The increase of 71 per cent since July, 1914, compared with an increase of 61.3 per cent. up to March, 1919, of 65.9 per cent. up to November, 1918, and of 52.3 per cent. up to June, 1918. The total increase for the five years' period on food was 85 per cent.; shelter, 28 per cent.; clothing, 100 per cent.; fuel, heat and light, 57 per cent.

For hundreds of years Mexican Indians had a horror of what they called the pest spot of Lake Chapala, near the shore at Tizapan, say the "New York Evening Post." They would not bathe in it or sail around it, declaring that the water was oily. Then, after a time, they cautiously began to paint their wooden boats with this oil, which proved so effective in keeping out the water that it became the general custom to use it. They did not know that this was petroleum gushing up through the water—a magnificent flow, about two miles out in the lake, which to this day gushes apparently without varying. When the water is low, petroleum floats in solid masses, each large globule weighing about twenty-five pounds.

Paris fashion reports tell of dresses in kid such as gloves are made of, and of trimmings of kid and patent leather on all sorts of outer garments. Leather being so scarce in Europe that boots and shoes have reached unprecedentedly high prices, it is to be requisitioned for other articles of dress also. That is the way of fashions. When leather is very plentiful again it will vanish from the costumes, and cloth-topped boots and whole cloth shoes will be in favor. It is a paradox.



DEVELOPMENTS IN SHOP EQUIPMENT



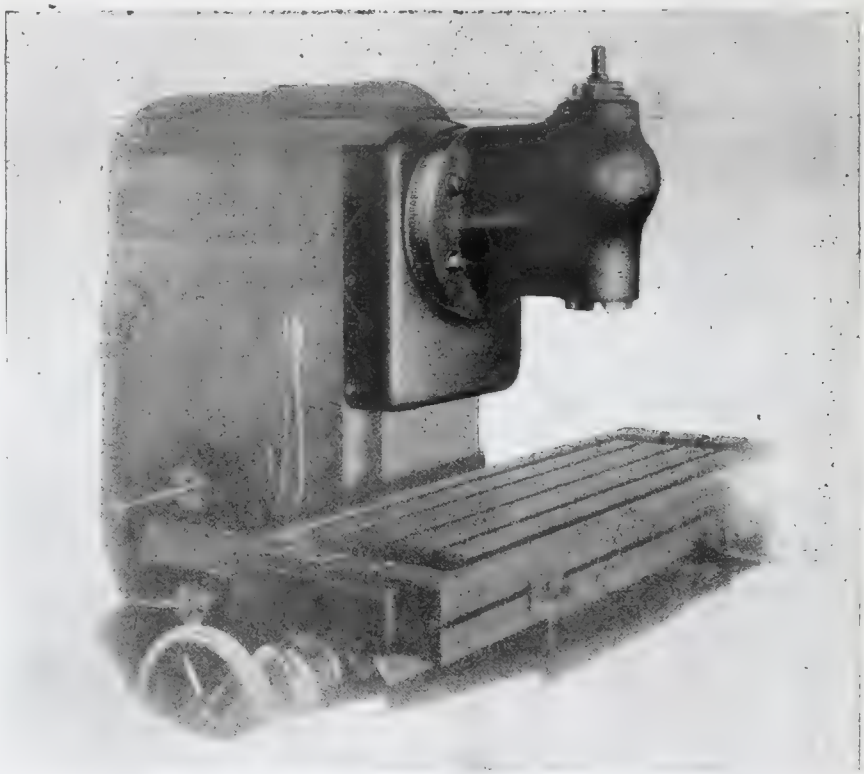
VERTICAL SPINDLE MILLING ATTACHMENT

Every machine shop at sometime or other has work that can be more advantageously performed with a face mill on a vertical spindle. To meet the demand of those who cannot keep a vertical milling machine busy, theere is always the vertical spindle attachment, which will give the range of a vertical milling machine on ordinary classes of vertical milling work.

The Cleveland Milling Machine Co., of Cleveland, Ohio, have developed a fixture of this nature, and a glance at the illustration will serve to show its general construction.

This attachment is of very rigid construction and capable of milling up to the capacity of the machine and is easily mounted on the face of the column.

The drive is taken from a gear fastened to the nose of the spindle, which in turn drives the spur gear on the horizontal shaft and the spindle is in turn driven by large mitre gears. All gears and shafts are made of steel and enclosed, running in bronze bearings throughout. The bearings on the spindle are the same as the milling machine spindle and form two taper cones in opposite directions adjusted by a nut on the outside of the spindle. The base of the head is graduated so that it may be set at any angle in a vertical plane parallel with the elevating screw. The distance from the face of the column to the vertical spindle and the distance from the nose of the spindle to the top of the table in the highest and lowest position covers the range of the ordinary vertical spindle milling machine. This attachment, when clamped in position on the dovetail slide of the column which extends above the centre line of the spindle, is as rigid as if it were a part of the milling machine.



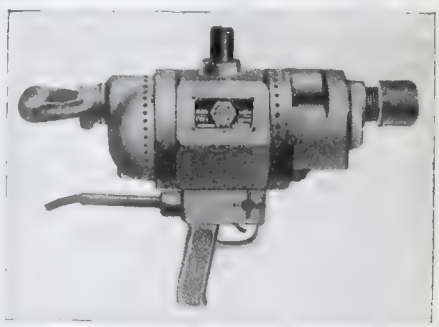
CLOSE UP VIEW OF THE ATTACHMENT.

GENERAL SPECIFICATIONS

	No. 1	No. 2	No. 3
Distance from Face of Column to center of Vertical Spindle	10¾"	12½"	15"
Distance Nose of Spindle to Table—			
Highest position	1¼"	1½"	2"
Lowest position	16½"	16½"	18½"
Cross Range or Machine	8"	10"	12"
Longitudinal Range of Machine	22"	28"	34"
Taper Hole in Spindle	No. 10 B.&S.	No. 11 B.&S.	No. 12 B.&S.
Net weight	200 lbs.	245 lbs.	350 lbs.
Shipping weight	225 lbs.	300 lbs.	415 lbs.
Code Word	Abba	Abbot	Acorn

BLACK & DECKER ELECTRIC DRILL

The Black and Decker Manufacturing Company, 105-115 South Calvert St., Baltimore, Md., has recently added a new size to its line of portable electric drills. The new machine is shown in the illustration, and has a capacity up to 9-16 in. in steel, and is provided with a No. 1 Morse taper socket. It is stated the machine will drill a 9-16-in. hole through machine steel at rate of 1½ in. per min. without overloading the motor. The housing is of Magnalite, an aluminum alloy. The gears are packed in grease in a separate grease-tight compartment, and the drill spindle runs in a long bronze bushing, thrust being taken by a ball-thrust bearing. The motor is air cooled and will run continuously without overheating. The Morse taper socket is in the form of a separable sleeve secured in the drill spindle by means of a large knurled nut. By unscrewing this nut the entire taper socket is easily removed from the spindle. The drill shank protrudes slightly beyond the end of the taper socket, in order that the drill may be removed. This construction is used, for if it was necessary to leave room for the drift-pin slot the machine would be considerably less compact, and the end of the spindle would be some distance from the bearing. The machine has the customary pistol grip and trigger switch, which characterize Black & Decker drills. The machine weighs 21 lb., has a no-load

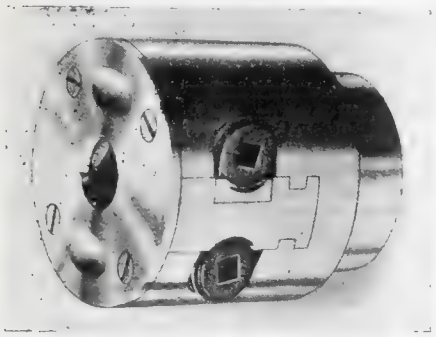


GENERAL VIEW OF DRILL.

speed of 600 r.p.m. and is supplied with interchangeable spade handle and breastplate, as well as electric connecting cable.

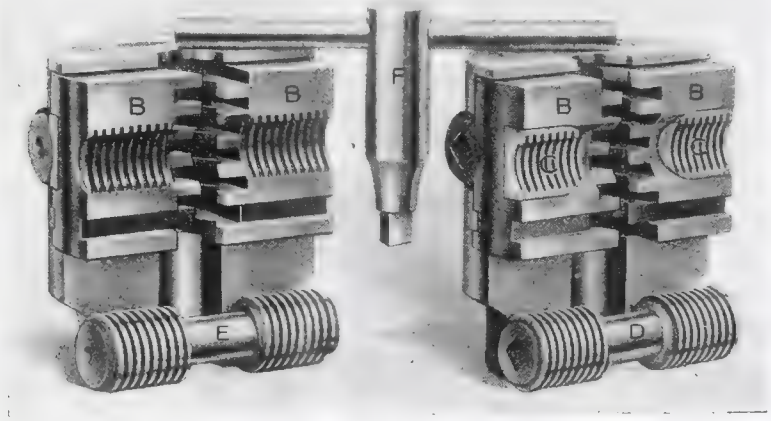
MARVIN & CASLER DRILL CHUCK

In the accompanying illustarations is shown the Casler twin screw drill chuck, which is a recent product of the Marvin & Casler Co., Canastota, N.Y.



GENERAL VIEW OF THE CHUCK.

The body of this chuck is made of close-grained cast iron, and jaws and screws are of tempered high-carbon steel. The claim is made that the combination of cast iron and steel gives long life to the wearing surfaces between the body, jaws, and screws. It will be seen that the body is reinforced by a steel cap plate, which prevents it from spreading when under strain; and a secondary screw doubles the grip of the drill chuck jaws and allows the drill to be driven to the limit of its strength. When using the chuck, the primary screw E, Fig. 2, is first operated to grip the drill shank between the jaws, and after this primary screw has been set up, the secondary screw D is operated to bring the floating nuts C against the ends of the pockets in the jaws B. The tightening of this secondary screw D results in producing a grip on the drill shank that is claimed to be twice as great as that obtained from a single screw. All parts of the chuck are made interchangeable to facilitate replacement, and there are no projections likely to catch the work or injure the operator.



SECTION THROUGH THE CHUCK.

NEWTON CENTERING MACHINE

The newly designed centering machine, illustrated and described herewith, is a recent development of the Newton Machine Tool Works, Philadelphia, U.S.A., for centering rough and irregular forgings.

Two universal centering vises of the interlocking type are supplied with the machine. The jaws are adjustable by means of a screw giving a capacity for rounds from 2 in. to 12 in. in diameter and of any desired length.

Vices are adjustable on the bed by means of rack and pinion.

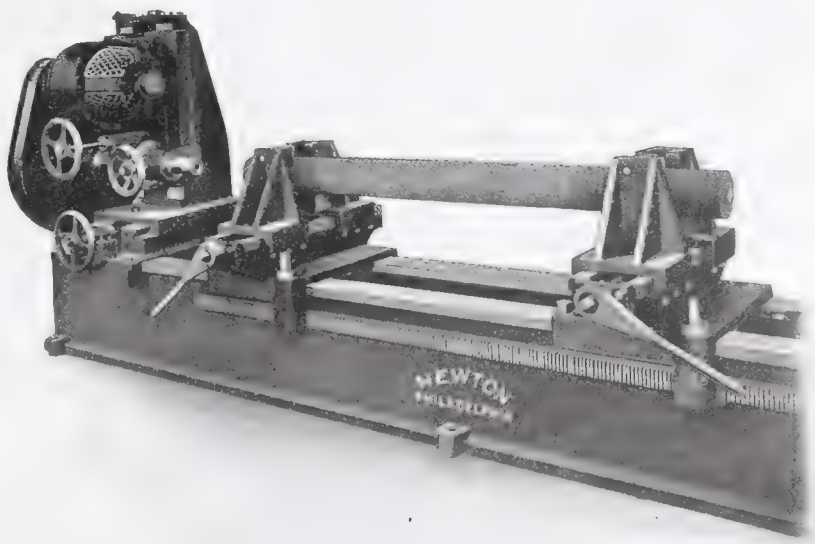
The spindle is of forged steel, 3 in. in diameter, running in bronze bushed bearings, has 4 in. cross and 4 in. of vertical adjustment, with 8 in. of hand feed.

The cross and vertical adjustments are equally divided from centre line of work.

The drive is by direct connected motor through a bronze driving gear.

Alignment of all adjustable parts is maintained by adjustable taper shoes.

Table of dimensions: diameter of spindle, 3 in.; in-and-out adjustment of spindle, 8 in.; vertical adjustment to spindle, 4 in.; cross adjustment to spindle, 1 in.; length of base, 16 ft.; width of base, 22 in.; distance centre of vise to top of base, 15½ in.; maximum distance centre of spindle to top of base, 17½ in.; minimum distance centre to spindle to top of base, 13½ in.



GENERAL VIEW OF THE MACHINE.

The All-Way Oiler Manufacturing Co., of Toronto, have placed on the market various oiler devices well worthy of investigation. The All-Way oiler is applicable to oil guns, combination filler and funnel, and the All-Way oil can.

Briefly, the oiler is the regular type of can fitted with flexible steel spout, made to bend in any desired angle or position without breaking or interfering with the flowing of the oil. There is no waste of oil when using this type of oiler, as the spout always reaches the desired spot.

At the end of spout a cleaning device is installed, which merely takes a second to operate. This same device also prevents oil from flowing too freely, thereby wasting.

The complete oiler is strongly made of copper-plated steel in different sizes.

Mr. H. Obee is manager of this concern handling these very useful lines.

Returns prepared at Washington indicate that stocks of food in storage in the United States on June 1 last were 20 per cent. greater than a year before, and the prices, where not higher than in 1918, were quite as high. There may be a suggestion of relief in such a situation, even if the profiteer is doing his best to prevent it. It costs money to keep foodstuffs in store, and the holder, if he does not sell, has to provide it.

One way to save time and eye strain is to prepare a large chart in the form of a stenciled board. This is made large enough for figures to be easily read from any part of the stock-room.

The MacLean Publishing Company
LIMITED
(ESTABLISHED 1888)
JOHN BAYNE MACLEAN, President. H. T. HUNTER, Vice-President
H. V. TYRRELL, General Manager.

PUBLISHERS OF

CANADIAN MACHINERY
AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.

B. G. NEWTON, Manager. A. R. KENNEDY, Managing Editor.

Associate Editors:
W. F. SUTHERLAND T. H. FENNER J. H. RODGERS (Montreal)
J. H. MOORE.

Office of Publication, 143-153 University Avenue, Toronto, Ontario.

Vol. XXII. TORONTO, August 21, 1919 No. 8

PRINCIPAL CONTENTS

The Canadian National Exhibition

BEFORE the publication of next week's CANADIAN MACHINERY the Canadian National Exhibition will be in full swing. The last five occasions of this great fair have been held with the shadow of war hovering over, but they have achieved a great measure of success. This year, with the doubts and uncertainties of the war period put behind, it should surpass any previous attempt in both the number of its visitors and the excellence of the exhibits. Apart from the exhibits themselves, there will be much of a spectacular nature, to attract the seeker after fresh sensations. The presence of the popular son of our democratic King will also lend a fillip to the fair.

One of the finest features of this annual gathering is the opportunity it gives for Canadians to become acquainted with each other, and to learn the good points of parts of our broad country of which he has but the most vague ideas. There are many good people in Ontario who can expatiate largely on the wonderful mineral resources of their native province, who express extreme surprise when they are informed that Quebec produced the largest part of the world's asbestos supply. The man from the Western coast, who is apt to look on anything east of the Great Lakes as hopelessly slow and out-of-date, may feel like revising his opinion after a few days spent at the "Ex." Anything that can help to overcome the narrow sectionalism that is the bane of this country is doing a valuable work.

Paying for the War

THE aftermath of Great Britain's long struggle is reflected in the speech of Mr. Lloyd George, warning his countrymen of the necessity of buckling down to earnest work to pay their debts. Great Britain poured out her blood and treasure with a lavish hand, and gave of what was her most vital asset unsparingly, that is her superb merchant fleet. Although the returns for the quarter ending June 30th show that she is beginning to pick up in this direction, she is still a long way behind, and the production of the coal mines has fallen off lamentably. With more men than ever before employed in the mines, the short hours and higher wages have increased the production cost enormously. The attitude of the labor unions under these circumstances is hard to understand. What benefit will accrue to them if they kick the country into bankruptcy is difficult to imagine, and we cannot think that the sound common-sense of the British people will allow the warning to go unheeded. There is a lesson to be gained from the British situation that should not be lost on some of the malcontents in Canada.

THE COUNTRY will sympathize with Sir Robert Borden in his unfortunate accident, which compels him to remain in bed while the festivities are in progress. However, it might be worse. In days gone by, a slip by a public man on the steps of a club when leaving would have given rise to many unkind conjectures.

DR. R. J. McFALL must be trying to get a position abroad. He has now got up and said right out that the price of beef has dropped. To call attention like that to a thing that nobody had even noticed, is sure to get him disliked. We expect to hear shortly that he has received an appointment to investigate the clothing situa- in the Solomon Islands.

As a fundamental thing it might be well to say that labor should practise as well as preach. That is, take the same attitude towards capital that it asks capital to assume towards labor, live up to its agreements with capital, and be responsible for its acts.

"Scientific management" does not mean giving the smallest possible wage and selling the product in the dearest market—it means the greatest possible output with the least possible expenditure.

There is no doubt that there would be room for still further reductions in hours, and for considerable improvements in both time and piece rates, if we could as a nation accept the theory that when we are at work we should work with all our might.

The prospect for a broader development of the chrome iron deposits of the Eastern Townships is one of considerable interest to Canada as the deposits are quite extensive and have not been worked to advantage for many years.

Prior to the war these were worked by open cuts or quarries but the process became expensive and dangerous as operations descended to considerable depths and had to be abandoned owing to the low market price for the commodity. The big deposits which have served the big steel producing centres of the world are in Rhodesia and New South Wales, so that during the war the commodity advanced to a high price around $32 per ton.

SOME critics in England consider the money grants to the successful military and naval leaders as rather niggardly, if anything. Well, what does a half million pounds or so amount to in these days, when wealth is computed in billions?

Another Viewpoint on the Accident Question

By ALBERT HEPWORTH

In your August 7th issue of CANADIAN MACHINERY you print a short article by Master Mechanic on the needlessness of accidents.

Master Mechanic treats this as a matter that is up to the individual workman. So it is, BUT legislation for the protection of the employee is to-day making big strides, and while individual carelessness is responsible for most accidents the law seems to hold the employer responsible because, theoretically, he should see that there was no opportunity for carelessness.

This attitude is rather hard, but it has ended those little shops where five machines were crowded in where only two should have been, where a tall man had to be careful in straightening up for fear of hitting his head against the countershaft, or where one had to bend under the belting should one wish to leave his machine. The writer has worked in some of these machine shops.

Some accidents are no doubt hard to avoid. A man might suddenly be taken ill and so become caught in a machine despite guards, an emery wheel might burst when put in motion, and a piece escape from the guard with enough velocity to inflict serious injury, a shaft hanger may snap under some sudden tension and come crashing down, a punch press may repeat, etc. The first of these is so rare as to be nil; the second can be reduced to nil by careful instruction of the operator, so that he will handle the wheels as they should be handled and not thrown around every time they are changed; the third can best be eliminated by the use of a steel hanger, as this hanger will bend rather than break, and the fourth can be reduced to a minmum by careful and forceful instructions to both the die setter and operator, etc.

Accidents described under your sub-heading, "Don't Take the Short Cut," are simply up to the management, because the first rule of all safety-first campaigners in any shop is that safety first rules and regulations are to be enforced regardless of the prejudices or the position of the objectors.

The writer a few years back was employed in a press shop, where methods of production were rather loose. Of course, the rate of accidents was high. The introduction of state insurance quickly brought the state inspectors on the back of the officials, because of the high accident rate, and something had to be done.

It was pointed out that large concerns having special departments for employment adopted a physical examination, and it was decided to adopt this; and eventually discharge all those not up to standard. I, though in charge of a department, was automatically in line for discharge and it gagged.

Noting that the slackness over the shop was the same I had eliminated in my department, I took the bull by the horns and saw the manager, and in the end the promise was given me to have my views laid before the executive board. This led to the appointment of myself to the following new duties: (1) That all applicants for a job be subjected to a physical examination and the jobs graded, for it was felt that, whereas a physically perfect man ought to be less liable to cause an accident, this did not at all hold in practice, in fact, the reverse seemed to hold; (2) that a perpetual shop inventory be held and kept up; this eliminated a great waste, and in the case of piece-workers a great deal of intentional or unintentional over-counting; (3) that all safety guards be put up and kept up, I being responsible to see that they were; (4) that all employees were instructed in the methods of safety.

The plan of combining these duties was, of course, only feasible in a small shop, but it has been found not only there, but in larger shops that the making of one man responsible for the application of safety devices has tended to decrease accident.

In the above case we found that during six months this system was in operation (I left to take another position then) not an accident occurred, and as far as I know this still holds good, though I have been out of touch with this plant.

Accidents, like the poor, we have always with us, but they can be reduced to a disappearing point.

The State and Government Insurance Departments will hold the employer rather than the employee responsible; in fact, accusations of gross negligence or carelessness on the part of the workman, unless proven beyond dispute, will not exonerate. Elimination of accidents is up to the employer to a great extent. This does not mean increased cost, but will certainly mean higher production and more contented men. The employer who insists on safety first may in many cases be called a crank, but his shop will not be called a butcher shop.

The above, I hope, will give you some light on accident prevention, and I hope will answer in part the question contained in the last paragraph of the article by Master Mechanic.

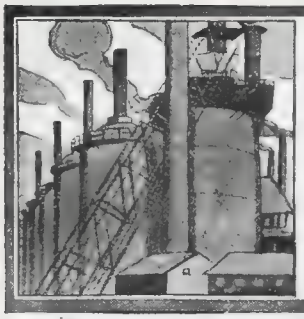
Dissolve one part of pearl ash in about eight parts of water; add one part of shellac and heat the entire mixture up to the boiling point. When the shellac has completely dissolved, cool the solution, and saturate it with chlorine until the shellac precipitates out entirely. When it is redissolved in alcohol, it makes a varnish which is as transparent as any copel varnish, and more satisfactory for a large number of purposes. This is a trade secret worth knowing.

To conserve the fats contained in the table refuse and dishwater of the soldiers' mess, the British military authorities installed grease traps. The fat collected in these traps averages more than one ounce for each man daily. The trap consists of a tin-lined wooden box, divided into two compartments by a partition that does not reach the bottom by about four inches. The dishwater and the table refuse are poured through a strainer into the vat. As the water cools, the fat forms a crust on top and is skimmed off.

A friend of mine who does heavy work of various kinds which requires gloves, and heavy leather gloves at that, advises me that gloves can be made to wear almost like iron by applying axle grease sparingly and being very careful not to get it on the cloth stitching, as the axle grease may disintegrate it somewhat.

Valuable china may be mended with the following mixture, and when dry it will resist hot water and ordinary usage. Mix a teaspoonful of alum and a tablespoonful of water. Place in a hot oven until it is quite transparent. Wash the broken pieces in hot water, dry and put them into the oven until they are warm; and while still warm coat the broken edges with the mixture thinly and quickly as it sticks instantly.

A handy paint mixer has recently been patented, consisting of a handle to which are secured two metal blades, intersecting each other at right angles. The lower portion of each is of dovetail shape, while above it is a pair of wings. This device is operated by immersing the blades in the paint, and then revolving them rapidly by placing the handle between the palms of the hands and moving them back and forth, as if rubbing them together.



MARKET DEVELOPMENTS

Dealers Report Continued Steady Buying

Machine Tool Dealers, Machine Shop Supply Men, and Steel Warehousemen All Report Steady Buying in Small Quantities—Automobile Trade Good Buyer

IN SPITE of embargoes, railway shopmen's strikes, and other strikes and threats of strikes, machine tool dealers, machine shop supply men and steel warehouse men profess themselves well satisfied with the situation. One machine shop supply man stated that the last two weeks were the best he had had this year, although all his business was made up of small orders. This shows that most of the small machine shops are keeping busy. An outstanding feature is the steady demand for material from the automobile trade, while railways are also buying freely, as reported last week.

* * * *

REPORTS from the United States show that there is a general stiffening of prices in the iron and steel markets. This is chiefly due to a better demand, but threats of further tie-ups due to various strikes make producers inclined to be conservative. There are so many factors to be taken into account that it is hard to keep track of them. The strike of the ore dockers stopped the movement of ore from Lake Superior, and the railroad car shop workers' strike produced a shortage of cars. Increased wages to railroad workers will bring about higher freights, so it is only natural that producers want to see just where they are heading. Basic pig iron has been sold in England at 165 shillings, considerably lower than American iron could be delivered there. There is considerable enquiry for export iron and the lowering of freights to Great Britain has enabled some orders to be booked for there.

* * * *

STEEL scrap has weakened somewhat from last week's prices, but it is thought that this is but a temporary condition. The labor situation is again affecting buyers of this trade, and the conditions are generally unsettled.

THE MARKET IS DULL AND UNSTEADY

Special to CANADIAN MACHINERY.

MONTREAL, Que., Aug. 18.—A combination of circumstances exist at present to make the current market of uncertain character. To the middle summer season, which is invariably associated with a decline in industrial activity and reduced demand, is added the disturbing element of labor unrest, a factor that is influencing the market conditions to no small degree. Conservative methods are the rule when sales are made, as the future is more or less obscured in the developments that are daily altering the outlook of business. Industry to-day is very much regulated by the attitude of labor and their demands, and while these, to some extent, are in keeping with the general conditions, the disorganization that is resultant of strikes and wage demands, is not conducive to normal industrial enterprise. The mills are not disposed to accept far future bookings, owing to the uncertainty of production costs, and consumers are only covering their immediate needs, the principal reason being the same as that of the producers. Many of the steel districts in the States are either affected by labor troubles or by the threatened demand for increased wages, factors that may ultimately result in early shut-downs, or curtailment of output. The general effect of a strike of any magnitude is felt all along the line, and when production stops at one point, the falling off in demand is at once transmitted to all other branches. It is this unrest among employees that prevent a more liberal policy of reconstruction. Many manufacturers of steel supplies and products are disposed to operate on a low profit basis in an effort to curb the demands of the men, but if wage increases are granted it must mean a further advance in steel prices. Steel activity in this district is confined to current requirements of consumers and the demand is about normal. The curtailment of operations at the Sydney plant of the Dominion Iron and Steel Co. is affecting the other areas that supply the basic materials of the steel mill of the company. The production of ore at Wabana will gradually ease up as a result of the reduced requirements. The limestone quarries of the company in Newfoundland has also suspended operations, as about a year's supply is now on hand. With mill quotations firm, dealers here have made no change in prices.

Single Machines Predominate

No new developments have taken place in machine tools of late and the general situation is virtually the same as it has been for the past couple of months. The volume of business passing is not great, but is of a character to encourage the dealer. The number of sales is the feature of interest, and while few of these run not more than one or two machines, the greater distribution compensates for the loss of larger orders. Like many other industries, the machine tool business is affected by the labor unrest, directly in some cases and indirectly in others. Uncertainty is the keynote and expansion or extension of manufacturing is difficult under such conditions. Supplies are moving with the usual freedom, but purchases are almost exclusively confined to current requirements.

Scrap Again Quiet

Market speculation is the chief factor affecting old materials at the present time, as the quiet demand does not tend to move the price of scrap one way or another. Some increased buying was felt a few weeks back, but this has been replaced by another dull period, in which the metal moves but slowly. The season

of the year may be partly accountable for this condition, as steel business is generally more or less affected about this time of the year. The apex of a few weeks ago has again been taken off and quotations show the market at a lower level, but the tone is one where anything may happen and it would not be surprising to see another reaction next week, with prices stronger. Coppers have declined about 2 cents per lb. in the past two weeks. Brass scrap is more firm, but has declined slightly in red brass turnings, also light and medium brass, which are one cent easier. Several steel lines show declines. Rails are down to $14.50 per ton, a drop of $5.50 in about three weeks. Wrought iron pipe has declined from $11 to $8 per ton.

STEADY VOLUME OF BUYING

TORONTO.—While there is no big buying being done, there is a steady volume of small orders which make business in most lines very satisfactory. As one dealer remarked: "We expected after the armistice to be able to take a six months' rest, but haven't seen the change yet." The unsettled conditions in the labor market are no doubt responsible for some holding back on the part of buyers, there is enough being done to make a very respectable turnover. This applies to machine tools and machine shop supplies generally. There are no price changes to record in the steel market, but they are in the air. Chain manufacturers held a meeting last week at which the price of chain was discussed, and, though nothing has been announced, it is expected prices will go up shortly on this material. There is a good buying of warehouse stocks, the railways being responsible for some of it, but the automobile trade for the larger part. Mills making automobile sheets are far behind on orders, and will not promise delivery in less than four to six months. This turns the attention of the makers to other sources of supply, that is the warehouses. There is not much demand for structural steel.

POINTS IN WEEK'S MARKETING NOTES

The continued unrest in the labor market is discouraging buyers of steel. Building construction falling off.

* * *

Machine tool and machine shop supply dealers are doing good business, though there is no large single buying.

* * *

There has been a dull week in the scrap metal market, with a drop of prices in steel making grades.

* * *

The automobile trade is buying considerable quantities of sheets, and automobile and railway buying is keeping steel warehousemen busy.

* * *

Basic pig iron from the Lorraine district of France has been sold in England at a much lower price than the American iron.

CONCERN IS FELT FOR FUTURE OF STEEL BUSINESS

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., Aug. 21—A much more conservative spirit is shown by both buyers and sellers, owing to recent unsettling developments, chiefly in connection with labor. The increased labor unrest makes it questionable whether manufacturing operations can be maintained at all points. The steel producers are less concerned over their own labor outlook than over the outlook of their customers. There is a possibility of a strike in the steel industry, but the prospect is very far from a probability. At the Detroit convention, over a year ago, the American Federation of Labor decided upon an aggressive policy of attempting to unionize the steel industry. At the Atlantic City convention last June the reports admitted that little success had attended the efforts, but since then the federation has been striving more earnestly. The information gathered by steel producers indicates that up to date nothing by way of organization has been accomplished that would make it feasible to attempt a strike. While the steel makers are very painstaking in gathering information, they admit that the possibilities of there being a strike may be greater than their information indicates.

Much more concern, however, is felt regarding the future operations of the steel industry's customers. There are involved three general classes of steel consumers, the railroads, the ordinary manufacturing consumers and those who might engage in large construction jobs of an investment character, such as factories, hotel and office buildings, power plants, bridges and the like.

As to the railroads, the demands of the brotherhoods for the Plumb plan of tripartite control obviously serve to make the future of the railroads still more uncertain, that such a radical and unpopular plan would really be adopted is improbable, but the time when the railroads will be placed in a settled position and thereby be able to engage in work of rehabilitation and expansion is placed farther in the future. In normally good times the railroads take, in one form or another, from 15 to 25 per cent. of the steel industry's output, and after a period of several years of particularly stringent economy they might be expected to take more, but now they are taking practically no steel and they will take no tonnage of consequence until their position is assured. The attitude of labor disclosed in the past fortnight defers the time when the steel industry can expect the railroads to be large customers.

As to ordinary manufacturing consumers, there are some strikes, and possibilities of others, and each strike temporarily deprives the steel industry of a customer.

It has become a generally accepted view that when there is a full normal demand for steel at least half the tonnage passes into works of permanent construction, classifiable as investments. Such construction requires favorable prospects for its inception. The investor must be assured that he would not save much money, in first cost, by waiting a year or two, and he certainly must be assured that if the job were undertaken, labor and materials would be continuously available until completion, for until completion the money spent is earning nothing. The increased labor unrest now manifest is observed to be having a discouraging influence upon investors. An evidence of this is the rate at which contracts for fabricated steel work are being placed. This business was growing very nicely in the second quarter of the year, promising eventual establishment of a rate of buying equal to the capacity of the fabricating shops, but in the past week or two the contracting has been distinctly lighter than formerly.

Presumably, as a result of these developments there is now a much more conservative spirit throughout the iron and steel trade. Producers are less willing to enter into contracts, fearing they may have trouble in making deliveries, while buyers are still less willing to make contracts. The volume of strictly new buying is much lighter than a month ago, but the volume of shipping orders, made up chiefly of specifications on old contracts, is heavy and is easily in excess of the rate at which material is being shipped.

Merely from the viewpoint of the business that the steel industry does not get the situation and prospects appear far from favorable, but from another angle this makes the situation all the more favorable, because with all these defects in the market situation there is a large demand for steel. The mills are operating at about 80 per cent. of capacity and no one seems to doubt but that the material made and shipped is going directly into consumption. With many buyers, particularly the railroads and investors, not represented, or, but poorly represented in the market, the volume of tonnage taken by others is large, much larger than anyone would

have expected. With only a moderate volume of additional business the steel industry would be operating at capacity.

It is now fairly well established that there will be no advances in the important finished steel products this year, unless there should be a wage advance, which at the present time seems improbable. The only reason it seems worth while to mention the fact that price advances are altogether unlikely is that a few weeks ago many steel producers, for reasons that were not entirely obvious, were talking about the probability of there being price advances.

The local pig iron market is strong, at least on the surface, the furnaces that are in operation being well sold up, while there is a fair running demand. Occasional lots of surplus iron, however, are sold with such difficulty that it is evident there are no large unsatisfied requirements. There are many idle furnaces and it is only occasionally that a furnace blows in. A demand for pig iron that would give the furnaces even moderately full employment can hardly occur without the large steel works buying pig iron. This they do when they are pressed for tonnage and have to supplement their own pig iron make by outside purchases.

The scrap market became weak and inactive a fortnight or so ago and has not since improved. The mills are all out of the market as to heavy melting steel, though some of them intimate they may make some purchases in a few weeks. Heavy melting steel is off about $2 from its high point of three weeks ago.

SENTIMENT AGAINST PRICE ADVANCES

Special to CANADIAN MACHINERY.

NEW YORK.—Though on a supply and demand basis, prices are due for a revision upwards, the sentiment is against any advance at the present time. This is on account both of the attitude of labor and the general result on the high cost of living. Makers are not taking orders far ahead, except where the purchaser is an old customer. There is no demand as yet for heavy shapes, the general investment demand not yet having come out. The Railroad Administration has an enquiry out for 100,000 tons of rails, but this is evoking but little interest. At the time of the last enquiry $55 was quoted.

Warehouse business is quiet, except in sheets, for which some sizable orders have been placed. In view of the probable car shortage mills are requesting that they be allowed to ship sheets in any cars available, protecting the stock as well as they can, but forwarding at buyer's risk. This impending shortage of cars and the probable advance of mill prices is expected to stiffen prices shortly.

There has been good business in cast iron pipe lately, but an enquiry for about 900 tons of six-inch and larger brought out some low prices. Prices last week quoted for 6-inch and heavier were $51 to $52.30.

HIGHER PRICES ALL ROUND

Special to CANADIAN MACHINERY.

From every point comes news of stiffening prices for pig iron. Probably the only point where this is not true is in the southern areas. Following are reports from the principal United States points:

New York.—There is considerable strength to the market here, and a brisk business, both domestic and foreign, is being done. Several thousand tons have been sold for United Kingdom, and enquiries amounting to nearly 200,000 tons for export are out. Central Foundry Co. purchased 10,000 tons foundry for delivery in last half and first half of 1920.

Boston.—Prices have made a general advance above the $28 Buffalo basis for No. 2X eastern iron. The advance is from $1 to $1.50 per ton. There has been some buying for first half delivery, and enquiry for last quarter and first half is good. New England sales during the week are around 7,500 tons.

Pittsburgh.—With makers of foundry iron well booked up for the remainder of the year, there is a tendency to look askance at 1920 business. This is due to the uncertainty of the labor market. The foundry men are feeling uneasy over the prospect of very much higher prices, $35 per ton having been mentioned as a possibility. Sales of foundry iron are around 20,000 tons.

Chicago.—There is not much enquiry, but a fair amount of selling is being done. Enquiries are being followed by sales with little delay. The strike of railroad shopmen has interfered with shipments, but not sufficiently to reduce the melt. The American Radiator Co. has purchased 4,000 tons for its Birmingham plant.

Buffalo.—There is a large volume of buying being done in spite of increase in prices. The aggregate sales amount to between 40,000 and 50,000 tons. Quotations are as follows: Basic, $26.75; No. 2 plain, $26.75 to $28; No. 2 X, $28 to $29; malleable, $27.25 to $29. Nearly all sales were for last half, a small proportion being for first half of 1920.

Cincinnati.—The situation here may be classified as a waiting one. There is not much prompt iron to be had, except in the case of furnaces which have off iron they are anxious to be rid of. The Jackson County district is tied up with labor troubles. While prices have been advanced no business is being done at the new rates.

St. Louis.—There has been a little buying for last quarter and first quarter of next year. 1.25 to 2.25 silicon is quoted at $26.75, with differentials on higher grades. Some foundries which had bought enough iron for their estimated consumption have had to purchase small additional tonnage.

Birmingham.—Selling is good, and it is expected that three more furnaces will be put in blast this month. There is no tendency to look for 1920 business on the part of furnaces, who are not even making any efforts for fourth quarter selling. No. 2 foundry is on a basis of $27.75.

Philadelphia. — While business has reached a fair aggregate total, it is much less than previous weeks. Furnaces are mostly asking higher prices. Copper free low phosphorus iron is quoted $36 to $38 furnace according to analysis.

LABOR UNREST UNSETTLES MARKET

Special to CANADIAN MACHINERY.

The market through various causes is unsettled. The labor situation is affecting the market in some cases, and prices have weakened. Following are quotations from various United States centres:

Boston.—Brisk business and tightening prices are in evidence here. There has been some buying of heavy melting steel for Pittsburgh delivery and prices ranged from $21 to $22.50. No. 1 machinery has been active and has sold at $28 for future delivery.

Philadelphia.—Steel scrap has weakened in some cases as much as $1 per ton from last week's prices. Cupola scrap on the other hand has shown greater strength, now being quoted at $25 to $26. The labor situation has been the cause of weakening in steel.

New York.—There is a good demand for steel making grades, although the Pittsburgh buyers are not in evidence. Pennsylvania buying is good for the eastern part of the state, and the quotations on heavy melting are from $15.35 to $16.50 f.o.b. New York. The labor situation is making buyers more cautious

Pittsburgh.—With buyers inclined to stay out of the market till the labor situation is clearer, and other buyers being about stocked up, scrap has weakened in all grades. The drop is about $1 per ton all round.

Buffalo.—The scrap market is dull here, though it is probably but a temporary condition. Prices are being maintained, and it is thought that there will be renewed buying of heavy melting in the near future.

Cleveland.—Notwithstanding a weakened market, dealers are very hopeful for the future. They point out that the demand for the finished product is heavy, and this is bound to be reflected in the scrap market. A sale of heavy melting involving 50,000 tons is reported, the price ranging from $19 to $23.

Chicago.—Although prices have halted after the long-continued advance from the spring, it would only take a small resumption of buying to bring them back again. Here, as elsewhere, the uncertain state of the industrial world is affecting the scrap market, which is always susceptible to these influences. Quotations for spot business are some-

what lower than the lately prevailing rates.

Cincinnati.—A dull market with prices unchanged is the condition here. Dealers are slow in buying outside iron that may be held up in delivery, cars being scarce and the labor situation unsettled. Railroads are not offering anything.

Birmingham.—Buying is light, but prices remain firm. Heavy melting is quoted much higher than buyers are willing to consider. All grades show strength.

READERS—ATTENTION!

AS no doubt readers of CANADIAN MACHINERY are well aware, Toronto Exhibition opens on August 23rd. Mechanics as a rule make their headquarters the Machinery Hall while at this fair, so a word to the wise is sufficient.

At the east end of this Machinery Hall, the **Garlock & Walker Machinery Co.** are going to have a display of more than ordinary interest. They have taken over a very large space, in fact 1,400 square feet of floor area, in order to show to best advantage the various machine tools they intend exhibiting.

Many of these machines will be in actual operation, with experts from the various factories operating them at full capacity. These gentlemen have been brought for a two-fold purpose, first to demonstrate the field and scope of their machines, and second to answer any questions relative to these machines. They invite close inspection, and will be only too pleased to give those interested all possible information. They particularly desire that questions be asked.

Included in this exhibit will be:

A **"Gooley-Edlund Inc. Co. Briggs Miller."** Of course, the Briggs Miller is well known as a manufacturing miller with wonderful capacity, so that this feature will be of keen interest to those wishing greater production where a miller can be used to advantage.

Then there will be a **Steptoe 24 in. single pulley drive shaper**, also a **Bath No. 2 Universal Grinder**, adaptable to practically any grinding operation.

There will also be a **Fitchburg 8x36 Cylindrical Grinder**, whose qualifications are already well known to the machine trade.

A **heavy duty Ryerson-Conradson single pulley drive plain milling machine** will also be shown.

Another feature worth while will be a complete line of **Thor Pneumatic and Electric tools.** This alone is worthy of attention.

Some other interesting features will be a **Lodge & Shipley three step cone 24 in. engine lathe, a Sibley sliding head drill press, a Rockwood back geared drill, and an Edlund sensitive drill press.** All these will be of the latest design.

A **Kelley Routing Machine** will also be shown, with samples of work turned out by this interesting type of machine tool.

Perhaps two of the biggest features of this exhibit are the remaining ones to follow:

The first of these is the **Adams Short Cut Lathe.** This lathe has never been exhibited here before and will prove an eye-opener to the progressive manufacturer, foreman or mechanic. Compact, accurate and built for manufacturing duplicate parts, this machine is indeed a study in good design. Six changes of speed are provided in an all geared head, and automatic stops, etc., etc., form a part of its equipment.

Automobile manufacturers, or, in fact, anyone desirous of making duplicate parts, would do well to look into this new machine tool.

Last but not least comes a varied line of **Cataract Machinery.**

A **Cataract sensitive drill,** with countershaft and back drill chuck will be shown. A **No. 3 Cataract Lathe,** with automatic chuck closer, together with screw slotting device, and medium weight turret, will be exhibited. This machine will also have a double cross slide.

Then there will be a **No. 4 Cataract Lathe** with thread chasing attachment. There will also be a No. 3 lathe with screw cutting, grinding, face and angle plate attachments, fully equipped with drill chuck and scroll and independent chucks.

A **No. 4 Cataract Bench Miller** will also be shown.

A **No. 7 Cataract Turret Tool Post lathe** will also form a part of this exhibit.

To show that a series of machines may be self-contained, the **Cataract** exhibit will also include an **R4 underdrive bench outfit.**

This arrangement will show four lathes, all self-contained and mounted on a special stand, together with a special underdrive.

A motor in convenient position on framework will drive the complete outfit.

Other interesting machines will also be shown, but space does not permit of further detail.

Enough to say to our readers in general that a visit to this exhibit will more than repay them for time spent in looking over this up-to-the-minute company's effort to place before those interested, a complete and varied line of machine tool equipment.

The McAlear Manufacturing Co. has recently moved into a new factory at Southwestern Avenue, Chicago, where they will manufacture their complete line of power plant and heating specialties, including packless radiator valves. They are issuing a new catalogue, dealing with these lines, which will be forwarded on request to any interested party.

The Algoma Steel Co. will have completed by November 1st their new rolling mills, wherein they will be able to manufacture beams and channels up to and including 15 in.; Z bars, rounds and squares, up to 14 in., and angles from 6 by 6 in. to 1¼ by 1¼ in.

Diamonds to the value of $856,000,000 have been mined in South Africa.

RECEIVE IMPERIAL SERVICE MEDAL

The following servants of the Canadian Department of Railways and Canals have been awarded the Imperial Service Medal:

Albert J. Atkinson, time-keeper, Moncton; Placide Babineau, carpenter, Moncton; Alexander Bain, station agent, Riverdale; Geo. T. Biddington, locomotive fireman, Moncton; John S. Cameron, section foreman, Penniac; W. D Cantwell, toolroom keeper, Charlottetown; John Corbett, section foreman, Moncton; Harry Cummings, hostler, Stellarton; Aime Dumas, conductor, Riviere du Loup; John A. Fraser, machinist, Moncton; J. M. Grant, section foreman, Riviere du Loup; Jos. Guay, brakeman, Levis; Alfred Lebel, conductor, Riviere du Loup; Charles Mercier, engineman, Riviere du Loup; R. W. Orchard, conductor, Mont Joli; Jules P. Parent, engineman, Riviere du Loup; A. C. Reid, carpenter, Moncton; Francis W. Rioux, engineman, Riviere du Loup; Jos. Scott, engineman, Riviere du Loup; Benjamin Steeves, section foreman, Campbellton; Matthew C. Webster, station agent, Pictou; Job Yeo, engineman, Charlottetown.

"What a different world this would be if we used our eyes to see the best in others and encouraged each other by speaking of it."—The Three Partners.

Don't let your competitors fix the price of your product—fix it yourself to cover your costs and a reasonable profit.

Apply common-sense with your cost system. The easiest way sometimes is the best way. Keep everything simple. Don't make anything harder than it ought to be. But remember to keep the main idea constantly in view—"I want to know my costs!"

Ho! ye who in the workshop toil and sweat the long day through, remember that it's harder still to have no work to do. Ho! all who labor, all who strive, ye wield a mighty power. Do with your will, do with your might, fill every golden hour. The glorious privilege to **DO** is man's most noble dower.

A concern has been formed in Denmark to begin the manufacture of typewriters.

It is said that the waste of timber in the yellow pine industry alone is sufficient to furnish raw material for the daily production of 40,000 tons of paper, 3,000 tons of rosin, 300,000 gallons of turpentine and 600,000 gallons of grain alcohol.

An American contemporary prefers the old name of "hobo" because it is easier to pronounce than the modern name of "Bolshevik."

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	.....
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	.....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$27 00	$27 00
Electro copper	26 00	27 00
Castings, copper	26 00	25 00
Tin	60 00	58 00
Spelter	10 00	10 00
Lead	7 25	7 00
Antimony	10 25	10 50
Aluminum	36 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Buttweld

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$15 00	$13 75
Copper, crucible	18 50	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine composition	17 00	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	15 00	14 75
Yellow brass turnings	10 00	9 00
Light brass	8 00	7 00
Medium brass	9 00	7 75
Scrap zinc	6 00	6 00
Heavy lead	5 00	5 25
Tea lead	3 75	3 50
Aluminum	18 00	18 00
	Per Ton.	Net.
Heavy melting steel	13 50	13 50
Shell turnings	7 00	6 00
Boiler plate	13 50	11 00
Axles (wrought iron)	20 00	20 00
Rails	14 50	13 50
Malleable scrap	15 00	17 00
No. 1 machine cast iron	20 00	18 00
Pipe, wrought	8 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	14 00	13 00
Cast boring	7 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts,	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	10 to 40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized	....	....
Queen's Head. 28 B.W.G.	....	....
Fleur-de-Lis, 28 B.W.G.	....	....
Gorbal's Best, No. 28	....	....
Colborne Crown, No. 28.	....	....
Premier, No. 28 U.S.	....	7 50
Premier, 10¾ oz.	....	7 80
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13.50; 5-16, $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.15; $13.00; ⅞ in., $9.60; ¾ in., $9.70; ⅝ in., $9.95; 1 in., $9.50; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $14.20; 5-16 in., $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.50; ⅝ in., $10.00; ¾ in., $9.70.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.15
Ammonium, carbonate	..
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.25
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	.75
Potassium sulphide (substitute)	2.25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	.80
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated

RESEARCH IN METALLURGY

Scientific research in metals and their properties has made considerable progress during the last few years, and the results of the work done is startlingly shown in the proceedings at the annual meeting of the Institute of Metals, held in London.

A paper by Dr. Rosenhain describes the method of preparation of a number of copper alloys and gives the results of tensile and hardness tests carried out on them. The alloys were intended to meet very stringent requirements involving extensive cold-working, so that high tensile strength with great ductility was aimed at. The alloys dealt with fall into two main classes. The first class consists of alloys of copper with aluminum, with manganese, and with both aluminum and manganese. Difficulties were experienced in casting these alloys into slabs, and special methods of casting were adopted. A process sometimes known as "pressure casting" which has been developed and patented by Mr. F. Tomlinson, was eventually adapted for use with these alloys and proved very successful. In this method the liquid metal is forced, by means of externally applied air pressure, through a feeder tube dipping into the molten metal nearly to the bottom of the crucible and communicating with the bottom of the mold. Alloys cast by this method were subsequently rolled into strips. The results of tensile tests show that a very high degree of ductility can be obtained, together with considerable tensile strength, by the use of manganese. For example, the alloy containing 7 per cent. aluminum without manganese has a tensile strength of just under 40 tons per square inch, with an elongation of 17.5 per cent. in the "as rolled" condition, while after annealing it still has a tensile strength of 27.5 tons per square inch, and the remarkable elongation of 71 per cent. The second class consists of alloys containing no aluminum; these are mainly combinations of manganese and zinc, or nickel and zinc, with copper. They were cast successfully with the aid of borax as a flux, and were subsequently rolled into thin strips of excellent quality. Of this series the strongest alloy is that containing 3 per cent. manganese and 10 per cent. zinc, which, in the old rolled condition has a tensile strength of 47 tons per square inch, with an elongation of 3 per cent., and in the annealed condition a tensile strength of 23 tons per square inch, with 36 per cent. elongation.

The effect of work on the metals and their alloys has elicited considerable attention of late years and the variations in their physical and mechanical condition that result from the application of work have been very fully investigated. Hitherto the hard metals and alloys have received the closest attention, whilst such metals as tin and lead have scarcely been considered. This is unfortunate, since many of the phenomena with which one is confronted in the case of the cold-worked hard metals and alloys might, by much study, be rendered explicable.

The researches of Goerens and Webster (among others) and of Alkins, in particular, have demonstrated that a very marked change in the physical and mechanical condition of the metals and their alloys is reached when the same have been deformed by certain well-defined amounts. Alkins, for example, has shown that when a copper bolt, previously annealed at 600 deg. C., and 9-16 in. in diameter, has been reduced in diameter about 29 per cent., it is so changed in condition that its ultimate strength in tension tends towards a constant value over a narrow range of reduction.

It has now been determined by Mr. Owen W. Ellis that the effect of cold-work upon a 39 per cent. zinc-copper alloy that he finds evidences of an inversion in the mechanical properties of the alloy in the neighborhood of 58 per cent. reduction in thickness of a strip. While the results of tensile tests of samples of the material that have been subjected to varying degrees of deformation are not of themselves conclusive, the results of Brinell hardness tests and of micrographic examination appear to afford satisfying evidence of a somewhat similar phenomenon to that recorded by Alkins.

An explanation of this peculiar change in condition is thought to be found in an extension of the law of annealing for strained metals and solid solutions propounded by Hanson at the last meeting of the Institute of Metals. This law stated that "for every degree of deformation there is a critical recrystallization temperature at which crystal growth is extremely rapid, and the size of the crystals produced by this rapid growth is the greater the smaller amount of deformation proceeding such annealing." This law appears to admit of the possibility of the temperature of the working of the metal or alloy coinciding with the "critical recrystallization temperature at which crystal growth is extremely rapid." It might even be inferred that the converse of the above law is true.

The process of cold work, viewed in the light of Reilby's theory, may be considered to result in the production of amorphous matter at the expense of the crystalline matter. It is suggested that there is at all stages of deformation a tendency for the reaction to take place, and that as the deformation to which the material has been subjected increases, so does this reaction continue, suffering a change in its rate when the critical degree or range of deformation has been attained. A graphic representation of these conditions results in the drafting of a curve representing the relation between the degree of deformation and the mechanical property which is almost identical in type to those obtained as a result of mechanical test.

A remarkable proof of the existence of the inversion in other alloys of copper is also afforded by the results of experiments made with a view to determine the power absorbed in the rolling of alloy strip. The power-reduction curves for 70-30 brass and for 20 per cent. nickel-copper for example, show most sharply-defined changes in direction, these changes in direction appearing to vary according as the mass of the material to be treated is changed.

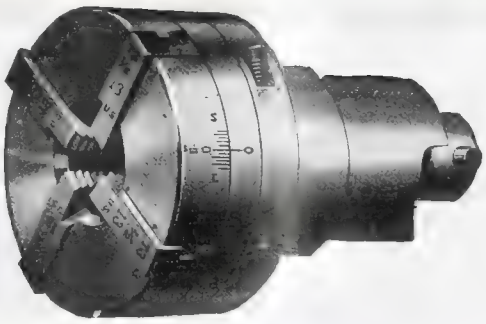
The above hypothesis as to the nature of the inversion in the property-deformation curves of the metals and alloys has been put forward, but no definite reason as to the cause of the inversion has been given. The processes of rolling and of drawing are such as result in the formation of a "strain gradient," to employ a term introduced by Jeffries, of most pronounced character within the materials undergoing deformation. As Jeffries has shown, a strain gradient produces a recrystallization gradient, and this, under proper temperature conditions, will produce exaggerated grain growth according to the germinative hypothesis. That the proper temperature conditions may be obtained, provided deformation is carried to sufficient extent, has, it is thought, been proved.

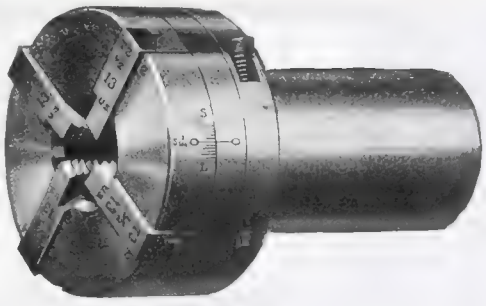
That these things are of intensely practical value must be patent to all and not to those concerned with the cold-working of metal alone. Both users and manufacturers of extruded rod, for example, have seen, not a few times, material showing very obvious signs of exaggerated grain growth. That this result may be obtained in the actual process of extrusion, given the correct conditions of temperature and of deformation, appears to probable rather than possible.

In conclusion, Mr. Ellis refers also to the exaggerated grain growth that may be produced as a result of stamping certain zinc—coper alloys—not, happily of the best types for general engineering work, within certain temperature ranges.

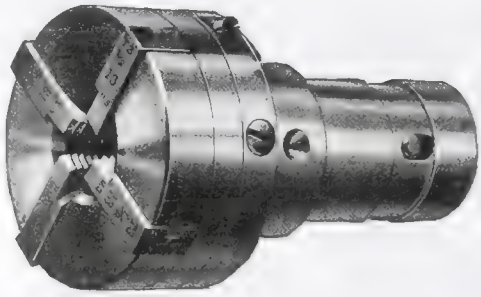
The tenacity-reduction curve shows a marked check in the rate of increase of tenacity at about 50 per cent. reduction in thickness, corresponding to the change of state, previously shown by Alkins to result from the progressive cold drawing of copper wire at a similar stage of reduction. There is a corresponding change in rate of decrease of percentage elongation and in rate of increase of scleroscopic hardness. The existence of another change at 80 per cent. reduction is suspected, as indicated by inflections in the tenacity curve, and the hardness curves. The scleroscope-hardness figures reach a maximum at this stage, but the auto-punch figures show a marked acceleration in the rate of increase.

A limited number of annealing experiments were carried out at temperatures of 600, 750 and 800 degrees centigrade, and the results point to incompleteness of softening of the severely worked strips as compared with the moderately-worked strips. The results of tensile tests, hardness test, and microscopic examination are in agreement, whilst scleroscopic tests on strips annealed at 750 deg. V., indicate the existence of a maximum at about 80 per cent. reduction. With the more severely worked specimens, after annealing, the strain structure on the polished and etched surfaces is visible without the aid of a microscope.





Geometric Solid Adjustable Die Heads



When one uses the word "ONLY," he needs to be sure of what he is talking about. With confidence we use the word in saying that a Geometric Solid Adjustable Die Head, fitted with a set of milled dies, is the only solid die head that will back off without stripping the thread.

Geometric Solid Adjustable Die Heads may be fitted with either a releasing shank, plain shank, or with special shank for the Gridley Automatics. The releasing shank permits the head to disengage from the shank upon completion of the thread. The plain shank fits the head for use on the turret of a lathe or on a live spindle, such as a drill press.

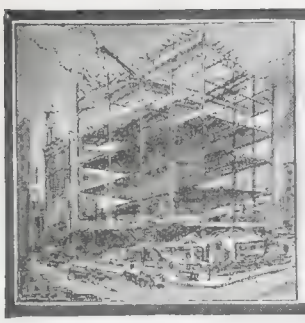
Apart from the fact that it is not equipped with the self-opening feature or the roughing and finishing attachment, the Geometric Solid Adjustable Die Head is the same in principle and construction and will do equally as accurate work as the other styles of Geometric Die Heads.

Whatever the requirements, there is a type of Geometric Die Head best adapted to the work.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

TRADE GOSSIP

Bond House Expands.—The Atlas Bond and Security Corporation, which recently underwrote the securities of the Anglin Norcross Construction Company, has opened branches in Toronto and Ottawa.

To Manufacture Fish Leather.—An American firm has been looking over the ground in Kingston, Jamaica, with a view to establishing a tannery for fish hides. The skins used would be those of sharks and other non-scaly fish.

Strike Thought Broken.—The Mine Managers' Association has held a meeting with the executive committee of the proposed new union of miners. They did not give out any statement of what transpired, but it is generally thought that the back of the strike has been broken.

Railway Shop Busy. — The Leaside shops of the Canadian National Railway are pretty busy these days. There are about twenty locomotives in the shops for repairs besides several coaches. About 300 men are employed at present, and skilled mechanics are being taken on daily.

Good Crop Prospect.—The Ontario crop situation is very promising, according to the Ontario Commissioner of Agriculture. Crops in Northern Ontario are further ahead this year than they have been at the corresponding time in previous years.

New Re-insurance Corporation. — A new company known as the Re-Insurance Corporation, Ltd., has been incorporated in England with a capital of £500,000, the shares being of the par value of £1. The corporation is closely associated with the Yorkshire Insurance Company.

New Toronto Factory.—A new suspender plant is to be erected on Spadina Avenue between Adelaide and Richmond Street at an estimated cost of $135,000. Mr. Henry Greisman, head of the King Suspender Company, is the interested party. The building will be of mill construction and be six storeys high.

New Cable Line.—As a result of the long-felt dissatisfaction with the Pacific cable service between the U. S. and Japan, a group of Japanese business men are floating a company with a capital of about $25 000.000 for laying a new cable line. American capital will likely be enlisted as well as Japanese.

Guelph Industry Expands.—The International Malleable Iron Company of Guelph have called for tenders for the construction of a new machine shop and warehouse. The building will be one storey in height and will be 189 feet by 120 feet, of concrete and brick, and will cost about $33,000. The architect is W. A. Maloney.

Motion to Wind Up.—A number of the shareholders of the Imperial Steel & Wire Company having made an application for the winding up of the company, Mr. Justice Kelly has adjourned the application to September 11th. In the meantime he has appointed Mr. G. T. Clarkson to make an examination into the affairs of the company.

Good Roads Movement.—It is understood that the Government is about to appoint an honorary advisory board which would assist the Department of Railways and Canals in its work for good roads. The personnel of the new board is stated to be made up of the following gentlemen: Mr. C. A. Magrath, late fuel commissioner; J. P. Mullarkey, of Montreal, and Mr. Home Smith.

Kingston Wants Elevators.—Kingston is going to make a bid to be the grain transhipment port in place of Port Colborne. The city council is going to urge the Dominion Government to build large elevators there. They point out that it will take two years to rebuild the elevator at Port Colborne and by that time the Welland Canal will be finished and Kingston will be the logical point for the steamers to bring their grain cargoes.

Pulp Mill Changes Hands.—The Aroostook Pulp and Paper Mill, which has been closed for some weeks, will be taken over and operated by a new company. The plant was built in 1917 and is well equipped, having a daily capacity of 60 tons, and employing about 200 men. The interest has been purchased by Mr. Gould and H. B. Stebney of Boston, and the plant will soon be in full operation and eventually will be extended. Mr. A. R. Gould, the president of the new company, is well known through his connection with the St. John Valley Railway.

New Welland Measurements. — The Department of Railways and Canals has issued a report on the alterations to the Welland Ship Canal. Its present length is 26¾ miles and comprises 25 lift locks, the dimensions of which are 270 feet by 45 feet, with a depth of water on the sills of 14 feet. The proposed canal will be 25 miles long, and the number of locks will be reduced to seven. These locks will be 800 feet in length by 80 feet in width in the clear, and the depth of water on the sills at extreme low water in the lakes will be 30 feet. The width of the canal at bottom will be 200 feet, and for the present the canal reaches will only be excavated to a depth of 25 feet.

Salving Port Colborne Grain.—It is understood that practically all the grain which was stored in the destroyed elevator at Port Colborne, owned by the United States Government, will be saved. It will be shipped to Montreal for transhipment overseas. In connection with this, a meeting was held in Montreal between the Harbor Commissioners, the Railway Board and the city Administrative Commission, when it was decided to put in two extra tracks on the harbor front to handle the extra grain. It was estimated that some 60,000,000 bushels would be shipped to Montreal from Port Colborne.

Airplane for Morrisburg.—Handley-Page, Ltd., have secured a Dominion charter to engage in a general aeroplane business in Canada. The capital stock will be $2,500,000, and the head offices of the company will be at Morrisburg, Ont. The directors named are William Harold and Admiral Mark Kerr, London, Eng.; Harry Clark, Montreal; Fred Chalmers and W. H. Gannon of Morrisburg.

Bridge Destroyed by Fire.—The forest fires that are sweeping Deer Lake have destroyed the C. N. R. bridge between Deer Lake and Burger. The C. N. R. trains are using the C. P. R. tracks for their through traffic. The local service is completely tied up. Alarm is felt for several families of settlers of whom no word has been heard for some days.

PERSONALS

Mr. M. W. Ferguson, who has been in the employ of the city of St. Thomas for the past six years as city engineer, has resigned his position.

Mr. D. A. R. McCannel has been appointed city engineer for the city of Regina. He has been in the service of the city since 1911, and for the past two years has been acting city engineer.

Mr. M. L. Cantell, C.E., has been elected a member of the Royal Society of London, England, according to recent advices. Mr. Cantell is a Provincial Government engineer of Manitoba, and resides at St. Boniface.

TENDERS

The Patricia Mining Company, Boston Creek, are in the market for equipment for mining and mill plant.

Tenders will be received up till August 25 for bridges and culverts of concrete in the township of York. Plans and specifications can be seen at the office of the township engineer, Frank Barber, 40 Jarvis Street, Toronto.

The School Commissioners of Halifax, N.S., are asking for tenders, which will be received till August 30 for the erection of four new school houses, complete with heating and electric plant. For information apply S. J. Wilson, secretary, School Commissioners' Office, Halifax.

The Board of Education of Peterborough are asking for tenders for a public school. Tenders will be received up to September 1 and plans and specifications can be obtained from W. & W. R. L. Blackwell, architects, Room 17, Bank of Commerce Building, Peterborough, or Melvern F. Thomas, 229 College Street, Toronto.

The Toronto Board of Education are asking tenders for an addition to Keele Street School. Tenders open till August 27. Specifications and information can be obtained at the office of Messrs. Chapman & Oxley, Harbor Commission Building, Toronto. Tenders will also be received by the same authority for addition to the Duke of Connaught School, Morley Avenue, and specifications can be obtained from the architect, Mr. J. Siddall, 250 Confederation Life Building, Toronto.

MARINE

Washington.—The United States War Department has announced the assignment of four of the fastest transports to the mail service between New York and Brest. The four vessels will be the George Washington, Leviathan, Agamemnon and America. The Shipping Board has now received 3,000,000 tons of shipping from the army authorities.

Sydney, N.S.—The huge Bayley raft, which was being towed over to Europe by the ocean-going tug Humber, broke adrift in a heavy gale off the coast. The tug has arrived in Sydney with part of the raft, and will proceed to sea to pick up the other part immediately. The raft has been ready for sea for the last two years, but owing to war conditions could not be taken across.

Port Stanley.—A diver is to be sent down to examine the hulk of the vessel discovered between Port Stanley and Rondeau. This is thought to be the wreck of the car ferry Bessemer, for which an unsuccessful search has so long been kept up. Pieces of the wreck were pulled up as much as two hundred feet apart, and this inclines the captain of

the searching tug to the opinion that he has at last discovered the missing vessel.

New York.—Word was received by wireless here that a collision had taken place off the Jersey coast between the outbound United States Shipping Board steamer Point Judith and the Norwegian steamer John Blumer. The John Blumer returned to New York in tow. The Point Judith was built by the Shipping Board last year, and is a vessel of 1,699 tons. The John Blumer is owned by C. H. Sorensen, and was built in 1914 and registered 1,481 tons.

Vessel Tears Out Gates.—The steamer Aztec, of Buffalo, while entering Lock 17 of Cornwall Canal, snapped a rope, and the way on the vessel caused her to push open the lock gates. The result was to put the lock in communication with the high level water, which rushed in and tore the gates away completely. The resulting flooding of the surrounding country resulted in the drowning of a boy who was on the bank, and two companions had a narrow escape of sharing his fate. They saved themselves by climbing a telegraph pole.

OBITUARY

The death occurred recently at the residence of his father, 676 Shaw St., Toronto, of Edmund F. Bradley. Death was due to heart failure. Mr. Bradley was local manager of the Erie City Iron Works.

From Saranac Lake, N.Y., comes the announcement of the death of Mr. Wayland Williams, of Laurie & Lamb, engineers, Montreal. Mr. Williams, who was 52 years of age, was at one time connected with the famous old Laurie Engine Works.

Mr. Samuel G. Lester, who was master mechanic of the Dominion Bridge Company, Ltd., died suddenly at the Royal Victoria Hospital, Montreal. He was 43 years of age, and for twenty-one years had been in the employ of the Bridge Co. He is survived by a wife and one daughter. He was a son of the late William Lester, of Toronto.

CLASSIFIED ADVERTISING SECTION

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order $1.00. Display rates on application.

HELP WANTED

DRAFTSMAN—A FIRST-CLASS MECHANICAL Draftsman experienced on Automatic Machines, Jigs and Fixtures for small interchangeable work; also a Junior Draftsman, must be a good penman. Permanent positions with good opportunity for advancement. Apply by letter or in person to The Singer Manufacturing Co., St. Johns, P.Q. State age, experience and salary expected. (c4m)

WANTED—MAN AS SHOP ASSISTANT TO Master Mechanic in a large manufacturing plant. Must be familiar with modern shop practice, capable of installing machinery to the best advantage, and completing the work speedily. Good opportunity for an energetic man. State experience, age, salary, etc., in first letter. Box 616, Canadian Machinery. (c4m)

WANTED

WANTED—ONE WATCHMAN'S CLOCK, SIX station, in good repair and slightly used. Box 620, Canadian Machinery.

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue.

Canadian Machinery

43-53 University Ave., Toronto

One of the things we all do well is to forget.

Names that were household words yesterday are gone to-day.

Because people knew your Name and your Line a year ago it is no sign they do to-day. They forget easily.

Keep yourself in the public mind by advertising. It is just as important to make old friends remember as it is to win new friends. Advertising does both.

AGENCIES WANTED

WANTED AGENCY OF SPECIALTIES FOR hardware factories and mills for Quebec city and district. Best connections and references. Reply to G. A. Vandry, 28 St. Joseph St., Quebec. (c8m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES, shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS Street, Toronto. Patterns in wood and metal for all kinds of machinery. (cfm)

BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind—including marine works—to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 631; Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works

Allentown, Pa., U.S.A.

DRAIN TENDERS WANTED

Tenders will be received by the undersigned Commissioners up till 2 o'clock p.m. Saturday, the 26th day of July, 1919, for the repair to the 3-4 Sideroad and 8-9 Concession drain, in the Township of Brooke, County of Lambton. Estimate cost of excavation, $9,600. Contractors must furnish security for the completion of the work. Plans and specifications may be seen at the office of the Clerk, Lot 16, Con. 9, Brooke Township. Lowest or any tender not necessarily accepted.

L. LINDSAY, R.R. No. 2, Alvinston.
C. ATKIN, R.R. No. 1, Inwood.
Commissioners. (c4m)

FOR SALE

17 ATLAS HORIZONTAL TUBULAR BOILERS (Babcock & Wilcox), 60 inch by 16 feet with Jones Underfeed Stokers. Dominion Sugar Co., Limited, Chatham, Ont. (c8m)

FOR SALE — FINE BIG ENGINE LATHE about 90" x 30 ft. Box 619, Canadian Machinery.

BOILERS FOR SALE

ALL IN EXCEPTIONALLY GOOD CONDITION. 17 Atlas Horizontal Tubular Boilers (Babcock & Wilcox), 60 inch by 16 feet, with Jones Underfeed Stokers; boilers lying at Kitchener. One 350 H.P. Erie City Boiler. Four 250 H.P. Scotch Marine Boilers with wet heads, now lying at Wallaceburg plant. Dominion Sugar Co., Limited, Chatham, Ontario. (c8m)

SITUATION WANTED

MECHANICAL ENGINEER AND DRAUGHTSman, with experience in dredging, hoisting and general engineering open for position. Box 617, Canadian Machinery. (c9m)

WANTED—POSITION AS TOOL ROOM OR machine shop foreman by man of ability; good references. Apply Box 618 Canadian Machinery. (c9m)

WHEN WRITING ADVERTISERS KINDLY MENTION THIS PAPER

WANTED

1—"Used" Plate Punch and Shear 36" gap, capacity 7/8" hole in 7/8" plate

—also—

1—"Used" Air Compressor, steam actuated — compound steam—simple air —12" x 12" cylinder.

Both machines must be modern in design and in good operating condition. Offers with full details, price and shipping point, will be considered.

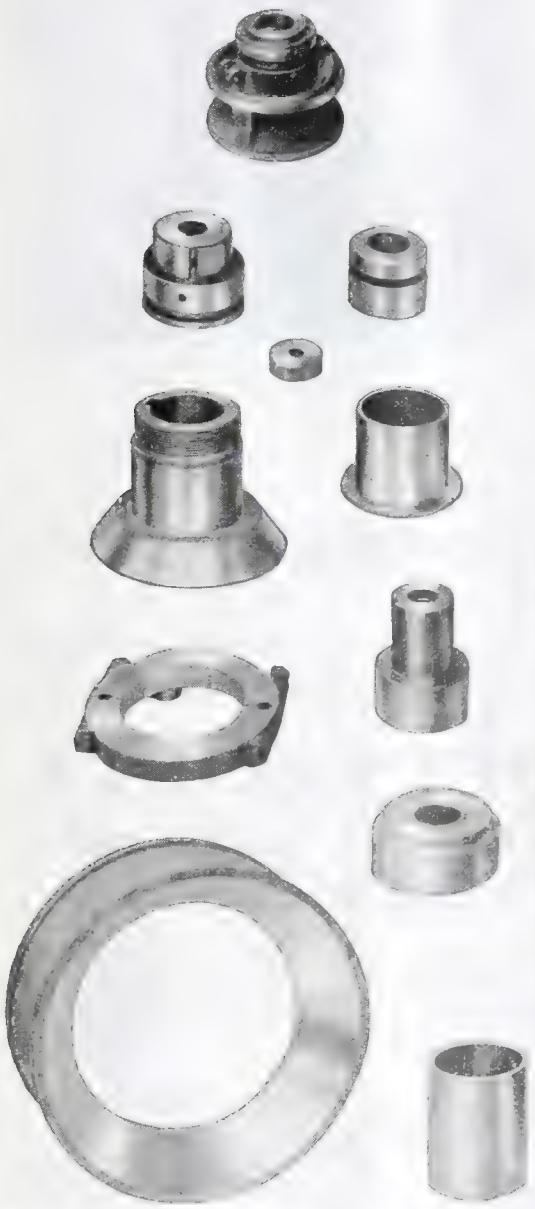
I. MATHESON & CO., LTD.

Builders of Machinery

New Glasgow, - Nova Scotia

FINISH

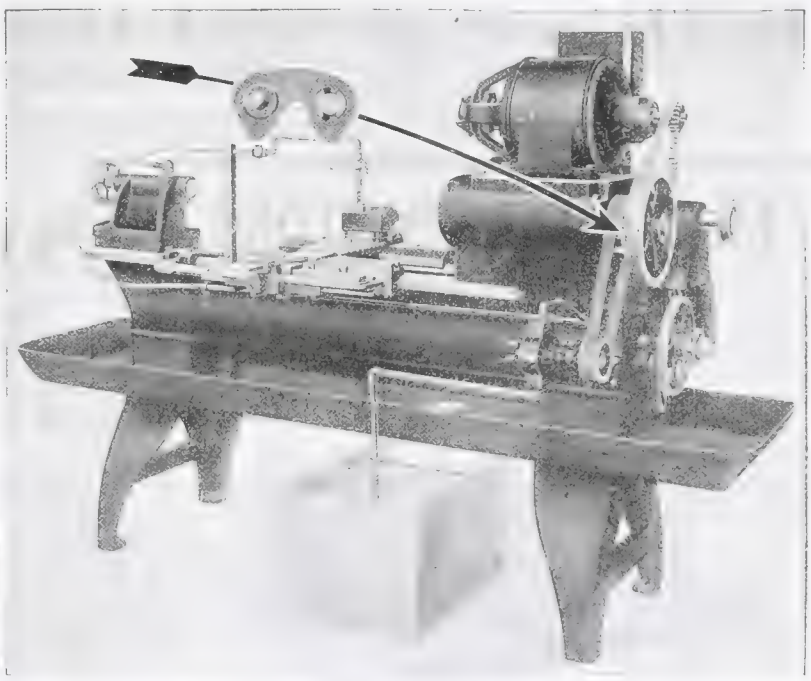
And Link-Belt Silent Chain Drives



THESE illustrations show some recently-completed parts machined on tools driven by Link-Belt Silent Chain Drives. In reproducing them in halftone it is impossible to show the smooth, even finish on each part just as it left the machine tool——But

Like all other parts completed on machine tools driven by Link-Belt Silent Chain Drives, these parts are smooth and clean cut, without chatter marks. Write for booklet No. 312 describing Link-Belt Silent Chain—the efficient drive for machine tools.

CANADIAN LINK-BELT COMPANY
LIMITED
WELLINGTON AND PETER STREETS, TORONTO

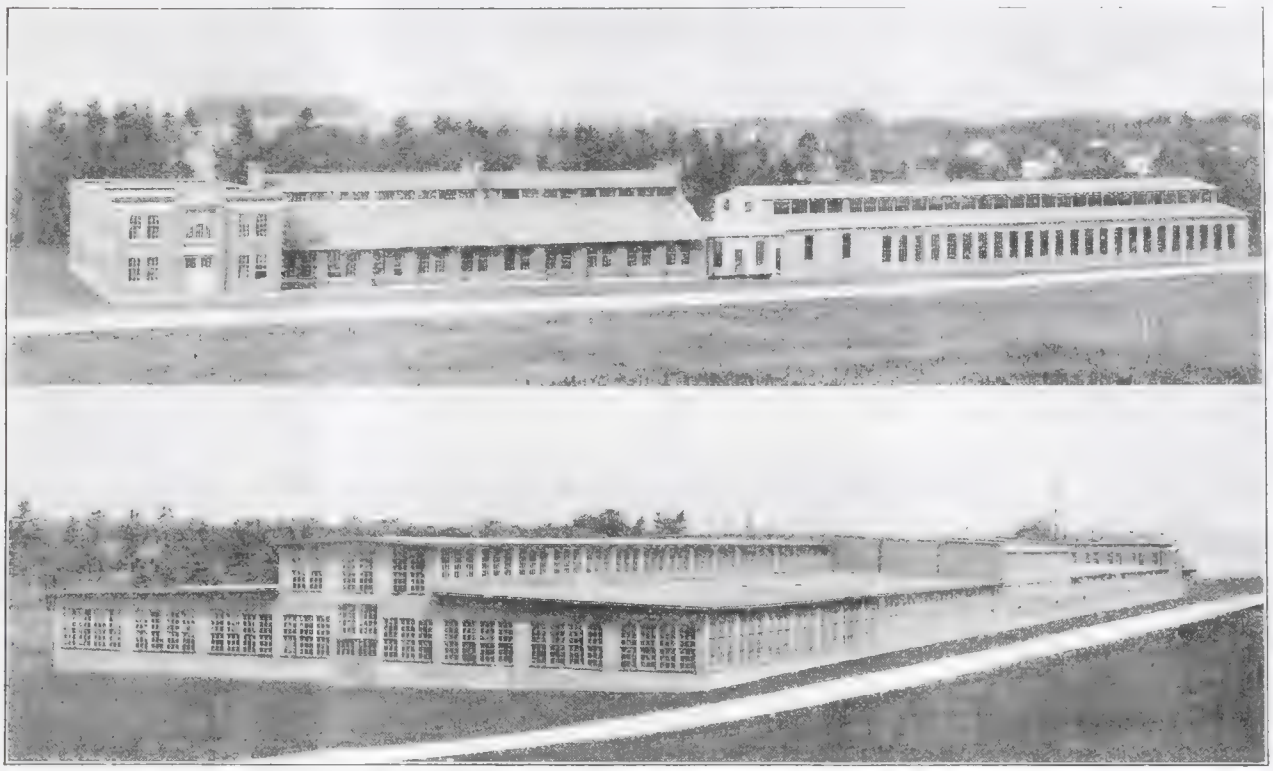


LINK-BELT
SILENT CHAIN DRIVES

PLANT FOR SALE

A large plant, idle since shell-making stopped, for sale at a very low price.

Total floor space, 109,500 sq. ft.



PLANT OF PEMBROKE IRON WORKS LIMITED
PEMBROKE, ONT.

Total area of property, nine acres.

This large plant, consisting of three separate buildings, approximately 1,000 ft. long, with a width of from 50 to 140 ft., has a floor space of about 109,500 sq. ft., and with an area of nine acres gives ample room for storage or expansion. The large building at the bottom contains 85,000 sq. ft., built in 1918, frame construction; building in upper left, built in 1909 for a stove foundry, brick construction, has a cupola, contains 18,380 sq. ft.; building in upper right, frame construction, built in 1916, contains 5,520 sq. ft. These three buildings can be used separately, each for a different line of manufacture. Railway running across the property, and Muskrat River bordering it. Price of entire property, $50,000.00.

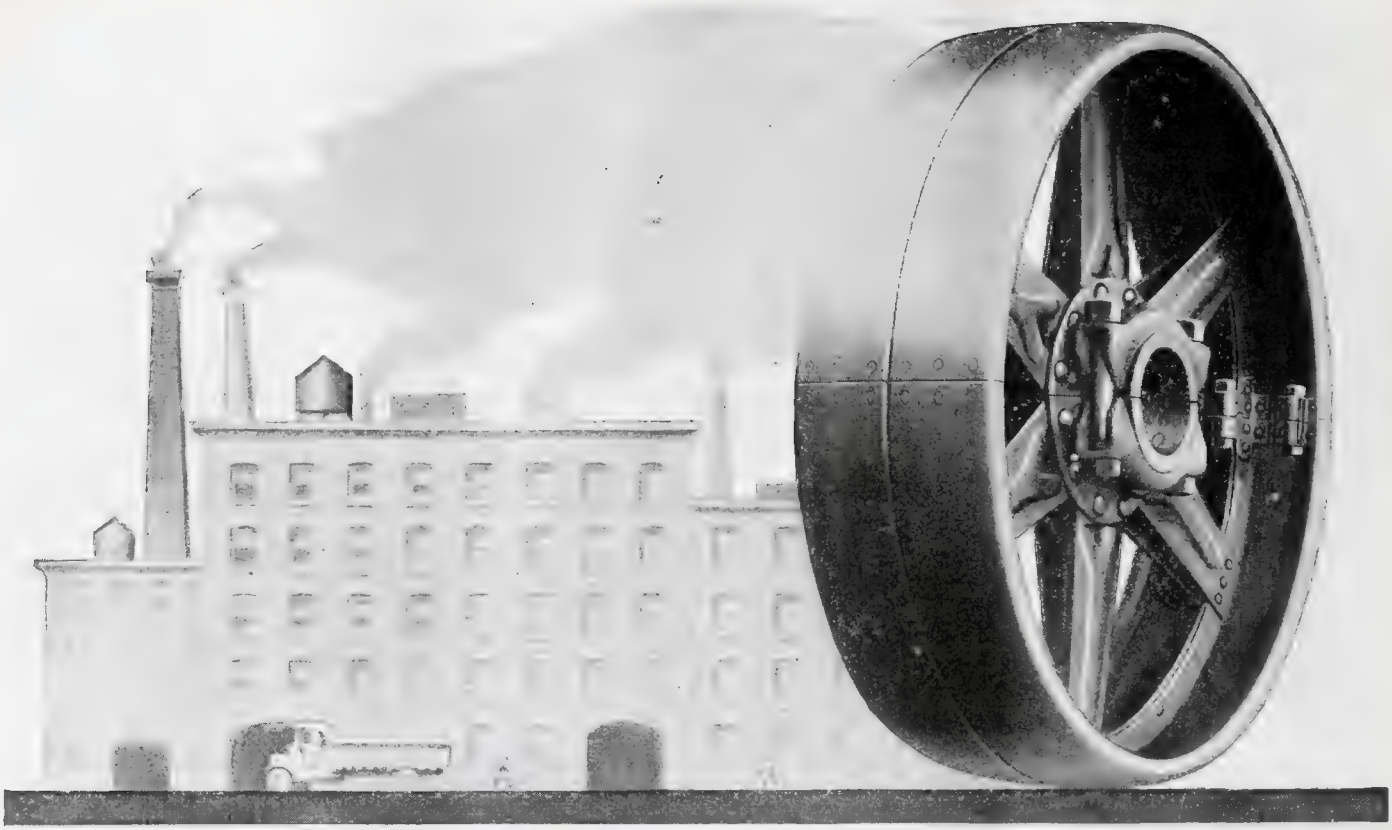
The Town of Pembroke is situated at the junction of the Ottawa and Muskrat Rivers, and is favorably located between the East and West, being on the main line of three transcontinental railways.

Pembroke is a well-known lumbering centre, and has an abundance of raw material available for manufacturing purposes, such as pine, spruce, birch, maple, ash and poplar, which can be brought in by water and rail at a minimum of cost. Unlimited Hydro-Electric power obtainable at very low rates. There is a plenitude of labor available, both male and female. An unrivalled opportunity for an industry to start up with a small outlay.

For further particulars and plan of buildings, apply to

PEMBROKE IRON WORKS LIMITED
PEMBROKE, ONTARIO

HINTS TO BUYERS



How Much Do You Lose Each Year Through Slipping Belts?

Many factories and mills are losing hundreds and even thousands of dollars a year through power losses and coal waste in the operation of their pulleys. This waste is due to belt slip and air fanning, which exists to an extent little recognized by the management.

AMERICAN STEEL SPLIT PULLEYS solve the problem of belt slip. They are guaranteed to reduce it to a minimum. They lengthen the life of the belt.

The face of the "American" Pulley has a high coefficient of friction and grips the belt. The sharp edges of the arms are constructed to cut the air and reduce air fanning to the lowest possible degree. The air groove in the face of the Pulley also helps to minimize belt slip.

American Steel Split Pulleys are manufactured to give maximum strength with minimum weight, check transmission losses and transmit power with great efficiency. They are guaranteed for double belt service and recommended for rim speeds up to 6,000 feet per minute.

NATIONAL DISTRIBUTION THROUGH SUPPLY HOUSES FROM PARENT STOCKS IN THE LARGER CITIES.

Our book, "Getting Maximum Pulley Efficiency," will tell you how to effect transmission savings. Sent free on request.

The American Pulley Company

Philadelphia, Pa.

AMERICAN STEEL SPLIT PULLEYS

Canadian Machinery BUYERS DIRECTORY

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

ABRASIVE MATERIALS
Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford.
Canadian Fairbanks-Morse Co., Montreal
Geo. F. Foss Mchy. & Sply. Co., Montreal
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plewes, Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co. Pittsburgh.
Rice Lewis & Son, Toronto, Ont.
William & Wilson, Ltd., Montreal.

ACETYLENE
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Union Carbide Co., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal
Garlock-Walker Mach'y Co., Toronto.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal.

AIR COMPRESSORS
See Compressors.

AIR CYLINDERS
Smalley-General Co., Bay City, Mich.

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, P.Q.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal.
Williams & Wilson, Ltd., Montreal.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener.

ALUMINUM
Canada Metal Co., Toronto.
Tallman Brass & Metal Co., Hamilton
Williams & Wilson, Ltd., Montreal

ALLOY, STEEL
Armstrong, Whitworth of Can., Montreal.
Boker & Co., Inc., H., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent Montreal
Pilot Steel & Tool Co., Montreal, Que.
Swedish Steel & Importing, Montreal.
Vanadium Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ANCHORS
Fellows Bros., Ltd., Chadley Heath, Eng.

ARBORS
Canadian Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Garlock-Walker Machinery Co., Toronto
Morse Twist Drill & Mach Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Williams & Wilson, Limited, Montreal

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Wks., Walkerville, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garlock-Walker Machy. Co., Toronto.
Gardner & Son, Robert, Montreal
National Acme Co., Cleveland, Windsor
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd. Montreal Que

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros., of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal
Canada Metal Co., Toronto.
G. F. Foss Mchy. & Sply. Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

AUXILIARY HEADS
Hoefer Mfg. Co., Freeport, Ill.

BABBITT METAL
Canada Metal Co., Ltd., Toronto, Ont.
Hoyt Metal Co., Ltd., Toronto.
Magnolia Metal Co., Montreal.
Rice Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal.

BAND SAWS
Oliver Machy. Co., Grand Rapids, Mich.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto
Morrow Screw & Nut Co., John, Ingersoll
Rochester Ball Bearing Co., Rochester.
Williams & Wilson, Ltd., Montreal, Que

BALLS, STEEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Chapman Double Ball Bearing Co., Toronto
Boker & Co., Inc., Montreal, Que.
Gray Ball Bearing Co., Ltd., Toronto
Rochester Ball Bearing Co., Rochester.
Marshall, Son & Bunney, Toronto.
Williams & Wilson Limited Montreal

BALLS, BURNISHING
Gray Ball Bearing Co. Ltd., Toronto.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corp., Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BARRELS, TUMBLING
Baird Machine Co., Bridgeport, Conn.
Kane Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie

BEADING MACHINES
Quickwork Co., St. Marys, Ohio.

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
G. F. Foss Mchy. & Sply. Co., Montreal.
Graton & Knight Mfg., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids

BELTING, BALATA
Federal Engineering Co., Toronto, Ont.

BELTING, RUBBER
Can Consolidated Rubber Co., Montreal.

BELTING, CHAIN
Can. Fairbanks-Morse Co., Montreal.
Can Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Montreal.
Baxter & Co., Ltd., J. R., Montreal.
Canadian Fairbanks-Morse Co., Montreal
Federal Engineering Co., Ltd., Toronto.
Graton & Knight Mfg., Worcester, Mass
Jones & Glassco, Montreal, Que.
McLaren Belting Co., J. C., Montreal.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Con. Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal
John Tullis & Son, Glasgow, Scotland.

BELTING, WOVEN
Federal Engineering Co., Ltd., Toronto

BENDING ROLLS, PLUTE & AUGH
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John, Dundas
Brown-Boggs Co., Ltd., Hamilton, Ont.
Can. Blower & Forge Co., Kitchener.
Garlock-Walker Mach. Co., Toronto.
Williams & Wilson, Ltd., Montreal.

BLASTING MACHINES, SAND
Garlock-Walker Machinery Co., Toronto.
Jardine, A. B., & Co., Hespeler, Ont.
National Mach. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal.

BILLET MARKERS
Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Swedish Steel & Importing Co., Ltd., Montreal.
Algoma Steel Corp., Sault Ste. Marie.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co., Milwaukee, Wis.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dennis Wire & Iron Works, London, Ont
Dominion Bridge Co., Montreal, Que.

MacKinnon Steel Co., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

BLACKSMITH WORK
The Thos. Pink Co., Ltd., Pembroke.

BLANKING
Hy. Hope & Sons of Can., Ltd., Peterboro

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie.

BLOWERS
Can. Blower & Forge Co., Kitchener, Ont.
Garlock-Walker Machinery Co., Toronto.
MacGovern & Co., Montreal, Que
Williams & Wilson, Limited, Montreal.

BLOCK, CHAIN AND ROPE
Fellows Bros., Ltd., Chadley Heath, Eng.

BLOCKS, CARGO
Fellows Bros., Ltd., Chadley Heath, Eng.

BLOW PIPES AND REGULATORS
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY
Commercial Camera Co., Providence, R.I.
Wickes Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co., of Can., Windsor, Ont.

BOARTZ
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield, Mass

BOLT CUTTERS
Fellows Gear Shaper Co., Springfield, Vt.
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros., of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Landis Machine Co., Waynesboro, Pa.
A.B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal.

BOLTS
Aikenhead Hardware Co. Toronto, Ont.
London Bolt & Hinge Wks., London, Ont.
Morrow Screw & Nut Co., John, Ingersoll.
Rice, Lewis & Son, Toronto, Ont.
Steel Co., of Canada, Ltd, Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co.., J. H Brooklyn, N.Y.

BOLTS, COUPLING
Gelt Machine Screw Co., Ltd., Galt, Ont.

BOLTS, STAY
Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, PATCH
Morrow Screw & Nut Co., John, Ingersoll.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto

BOLT THREADING MACHINERY
Jardine & Co., Ltd., B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Cleveland, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Limited, Montreal.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co., Toronto.
Canadian Fairbanks-Morse Co., Montreal
Can Ingersoll Rand Co., Sherbrooke Que
Garlock-Walker Mach. Co., Toronto.

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock Walker Machinery Co., Toronto
Oliver Mach'y Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Hoefer Mfg., Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Roelofson Machine & Tool Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Foss Mch. & S'ply Co., Geo. F., Montreal
Oliver Mach. Co., Grand Rapids, Mich.

Niles-Bement Pond Co., New York
Williams & Wilson Ltd., Montreal, Que.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland

BRAKEBAND LINING CUTTERS
Peck Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can
Electric Steel & Metals, Ltd., Welland.

BRASS AND COPPER BARS, RODS BRAKES, CORNICES
Peck, Stow & Wilcox Co., Southington, Conn

BRASS FOUNDERS
Canada Metal Co., Toronto.
Greenleafs, Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Niles Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refractories, Montreal.

BRIDGES, RLY. AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto.

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto.
Tallman Brass and Metal Co., Hamilton.

BRONZE COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton.
Foss Mchy. & S'ply Co., Geo. F. Montreal
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbroooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd, Walkerville.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananoque.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll.

CALIPERS
Pangborn Corporation, Hagerstown, Md.
Peck Stow & Wilcox Co., Southington, Conn.

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CABLE, ELECTRIC
International Machinery & Supply Co., Ltd., Montreal, Que.

CALKS, BOOT
Lufkin Rule Co., of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBIDE
Lyon Carbide Co., Toronto, Ont.

CARBONIZING BOXES
Can. Driver Harris Co., Ltd., Walkerville
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Swedish Crucible Steel Co., Windsor.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Ltd. Montreal
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS BRONZE, COPPER, AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland.
Fellows Bros., Ltd., Chadley Heath, Eng.

CARRIERS COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll
Alexander Fleck, Ltd., Ottawa.
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie.
International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., A., Fortierville, Q.
Brown Boggs Co., Ltd., Hamilton.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull
International Malleable Iron Co., Guelph
Kennedy & Sons, Ltd., Wm., Owen Sound
Katie Foundry, Ltd., Galt, Ont.
Hamilton Co., Wm., Peterboro.
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull.
Kennedy & Sons, Ltd, Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.

CEMENT MACHINERY
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Gardner, Robt. & Son, Montreal.
Houlburt, Rogers Mch Co., South Sudbury, Mass.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Niles Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros Co., of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

CHAIN, WELDED COIL
Fellows Bros., Ltd., Chadley Heath, Eng.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Machy. Co., Toronto.
Morris Crane & HoistCo., Herbert, Niagara Falls, Ont
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glassco, Montreal, Que

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BOOM, TIMBER
Fellows Bros., Ltd., Chadley Heath, Eng.

CHAINS, BICYCLE, DRIVE AND BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, FORGED
Fellows Bros., Ltd., Chadley Heath, Eng.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson Ltd., Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, N.Y.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Lab'tory, Ltd., Toronto

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co. Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., Ashburnham, Mass.
Bicknell-Thomas Co., Greenfield, Mass.
Bertram & Sons Co., John, Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Mach'y Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg Co., Hartford, Conn.
Modern Tool Co., Erie, Pa.
Rice Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson, Ltd., Montreal, Que

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont
Bicknell-Thomas Co., Greenfield, Mass.
Can. Blower & Forge Co., Kitchener.
Whitney Mfg. Co., Hartford, Conn.

CHUCKS, FRICTION AND TAP
Bicknell-Thomas Co., Greenfield, Mass.
Victor Tool Co., Waynesboro, Pa.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKING MACHINES
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement Pond Co., New York.
Roelofson Machine & Tool Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach. Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser & Co., Inc., Fort Wayne, Ind.
Williams & Co., J. H., Brooklyn, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Wright Mfg. Co., Lisbon, Ohio.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Q.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Jones & Glassco, Montreal, Que.
Positivte Clutch & Pulley Wks., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

COAL HANDLING MACHINERY
Bond Engineering Works, Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.

COILING MACHINERY, WIRE AND SPRING
Garlock Walker Machinery Co., Toronto.
Sleeper & Hartley, Inc., Worcester, Mass.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLD ROLLED STRIP, ALL METAL COLLARS, SHAFTING
Can. Driver-Harris Co., Ltd., Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston,
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C. Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll Rand Co., Sherbrooke.
Cleveland Pneumatic Tool Co., Toronto.
Curtis Pneumatic Machy. Co., St. Louis
Garlock-Walker Machy. Co., Toronto.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found'y & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
Banfield, W. H., & Sons, Toronto.
Brown Engineering Corp., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Mach'y Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

COOLERS, WITH DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener.

COPPER, BUS BAR, SHEET, PATES, RODS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

COUNTERSHAFTS
Almond Mfg. Co., Ashburnham, Mass.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Williams & Wilson, Ltd., Montreal, Que.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson Ltd., Montreal, Que

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.

COUPLINGS, PLAIN, FLEXIBLE AND CUT OFF
Cleveland Pneumatic Tool Co., of Canada, Toronto.
Gardner, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Que.

CRANES, GOLIATH, PNEUMATIC AND PORTABLE
Morris Crane and Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville.
Williams & Wilson, Ltd., Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis.
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANES, TRAVELLING AND JIB
Fellows Bros., Ltd., Chadley Heath, Eng.

CRANK SHAFTS
Canada Found'n & Forgings Ltd., Welland
Williams & Co., J. H., Brooklyn, N.Y.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Link-Belt Co., Toronto
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CRIMPS, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHED STEEL
Pittsburgh Crushed Steel Co., Pittsburgh

CUPOLAS
Can. Blower & Forge Co., Kitchener.
Northern Crane Works, Walkerville.

CURB PUMPS FOR OIL, GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

CURRENT TRANSFORMERS
Electric Steel & Metals, Ltd., Welland.

CUT-OFF COUPLINGS, FRICTION
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTERS, BOLT
See Bolt Cutters.

GEAR CUTTERS
Fellows Gear Shaper Co., Springfield, Vt.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co., Toronto.

CUTTER HEADS
Oliver Machinery Co. Grand Rapids, Mich

CUTTERS, PIPE (See Pipe Cutters)

CUTTERS, MILLING
Becker Milling Mach. Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cleveland Twist Drill Co., Cleveland.
Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

CUTTING-OFF MACHINES
Armstrong Bros., Tool Co., Chicago.
Bertram & Sons Co., John, Dundas.
Can. Fairbanks-Morse Co., Ltd., Montreal
Curtis & Curtis Co., Bridgeport, Conn.
Foss Mchy & S'ply Co., Geo. F., Montreal
Garlock-Walker Machinery Co., Toronto
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hurlburt, Rogers Machy. Co., South Sudbury, Mass.
Hall & Sons, John H., Brantford, Ont.
Kennedy & Sons, Wm., Owen Sound.
Niles-Bement-Pond Co., New York, N.Y.
Peerless Machine Co., Racine, Wis.
Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis
Standard Machy. & Supplies, Montreal.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTING COMPOUND AND CUTTING OIL
Cataract Refining Co., Ltd., Toronto.

CUTTING OIL, RECLAIMING SYSTEM
Bowser & Co., Inc., Fort Wayne, Ind.

CUTTING AND WELDING PLANTS
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

CYANIDE AND LEAD BATH POTS
Swedish Crucible Steel Co., Windsor.

CYLINDERS, AIR
Ford-Smith Machine Co., Hamilton, Ont.
Smalley General Co., Inc., Bay City, Mich

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co., Hinckley, Ill.
Kelley Reamer Co., Cleveland, O.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

DIAMOND TOOLS
Anderson & Co., of Can., Geo., Montreal
Ford-Smith Machine Co., Hamilton, Ont.
Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Detroit.
Williams & Wilson, Limited, Montreal.

DIAMONDS, CARBON AND BORTZ
Wheel Trueing Tool Co., Detroit.

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

DIE BLOCKS
General Steel Co., Milwaukee, Wis.

DIE HEADS, AUTOMATIC
Greenfield Tap & Die Corp., Greenfield Mass.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIES, BRASS PRINTING, EMBOSSING AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa
Pittsburgh Steel Stamp Co., Pittsburgh.

DIES FOR BIT BRACE USE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Wells Brothers Co., of Canada, Galt.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Banfield, W. H., & Son, Toronto.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardiner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Marshall, Son & Bunney, Toronto.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass
National Acme Co., Cleveland, Ohio.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Montreal.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Wells Brothers of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que

DIES, PIPE THREADING
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Butterfield & Co., Rock Island, Que.
Landis Machine Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

DIES, THREADING
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

DIE SINKERS
Becker Milling Machine Co., Boston
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Firth & Sons, Thos., Montreal, Que.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt.

DIE HEADS
Greenfield Tap & Die Corp., Greenfield, Mass
Wells Bros. of Canada, Galt, Ont.

DIES, SELF-OPENING
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Wells Brothers Co. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DIE FILING MACHINES
Oliver Mach. Co., Grand Rapids, Mich.

DIE STEEL, HOT AND COLD WORK
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

DIES FOR SCREW PLATES
Wells Bros. Co. of Can., Galt, Ont.

DIES, SHEET METAL WORKING
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Windsor Mach. & Tool Co., Windsor.

DIES, SCREW AND THREAD
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., of Can., Galt, Ont.

DISCS, LEATHER, STEEL
Graton & Knight Mfg. Co., Worcester, Mass.
Swedish Steel & Importing Co., Montreal.

DIRECT CONNECTED UNITS
MacGovern & Co., Montreal, Que.

DRAFT, MECHANICAL
W. H. Banfield & Sons, Toronto.
Butterfield & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
A. B. Jardine & Co., Hespeler, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRAWING
Henry Hope & Sons, Ltd., Peterboro, Ont.

DRESSERS, GRINDING AND EMERY WHEEL
Can. Desmond-Stephan Mfg. Co., Hamilton
Wheel Trueing Tool Co., Windsor, Ont.
Williams & Wilson, Limited, Montreal

DRILL PRESSES
Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford.
Can. Blower & Forge Co., Kitchener.
Canada Machinery Corp., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto
Garvin Machine Co., New York.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
U. S. Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILL RODS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

DRILLING MACHINES, GANG
Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE
John Bertram & Sons Co., Dundas.
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefer Mfg. Co., Freeport, Ill.
Henry & Wright Mfg. Co., Hartford, Conn
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement Pond Co., New York.
Rockford Drilling Mach Co., Rockford, Ill

DRILLING MACHINES, RADIAL AND TURRET
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, SENSITIVE
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal
Garlock-Walker Mach. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal,

DRILLING MACHINES, UPRIGHT AND HORIZONTAL
Aurora Tool Works, Aurora, Ind.
Blomquist-Eck Mach. Co., Cleveland, O.
John Bertram & Sons Co., Dundas.
Garlock-Walker Mach. Co., Toronto, Ont
Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp., Galt, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Fry's (London), Ltd., London, Eng.
Garlock-Walker Mach. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill
Niles-Bement-Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

DRILLING MACHINES, SPECIAL
Hoefer Mfg. Co., Freeport, Ill.

DRILLING MACHINES, WALL RADIAL
Lynd-Farquhar Co., Boston, Mass.
Wickes Bros, Saginaw, Mich.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto.
W. F. & John Barnes Co., Rockford, Ill
Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal
Fry's (London), Ltd., London, England
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
U.S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Machine Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Can., Walkerville

DRILLS, CARBON
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll

DRILLS, ELECTRIC, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati
Geo. F. Foss Mch. & S'ply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Mach. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, EMERY
Garlock-Walker Mach. Co., Toronto, Ont.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal
H. A. Drury Co., Montreal.
Geo. F. Foss Mch. & S'ply Co. Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Taylor J. A M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.

Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati.
Cleveland Twist Drill Co., Cleveland
Garlock-Walker Mchy Co., Toronto, Ont.
A. B. Jardine & Co. Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch Co., New Bedford Mass
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.

DRILLS, ROCK

Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
The Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK

Cleveland Twist Drill Co., Cleveland.
The Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Can., Walkerville.

DRINKING FOUNTAINS, SANITARY

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRIVES, CHAIN

See Belting, Chain.

DRIVING TOOLS

The Thos. Pink Co., Ltd., Pembroke, Ont.

DRY CLEANING SYSTEM

Bowser & Co., Inc., Fort Wayne, Ind.

DRYERS, SAND

Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES

Baird Machine Co., Bridgeport, Conn.

DRUM CONTROLS

Elec. Steel & Metals, Ltd., Welland, Ont.

DUMP CARS

Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM

Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT

Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS

Can. Blower & Forge Co., Kitchener, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES

Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELECTRICAL SUPPLIES

Can. General Electric Co., Toronto, Ont.

ELECTRIC FURNACE

Electric Steel & Metals, Ltd., Welland.
General Steel Co., Milwaukee, Wis.

ELECTRICAL RESISTANCE MATERIALS, NICHROME, KROMORE, CHROMAX, CLIMAX, NICKEL, SILVER, ADVANCE.

Can. Driver-Harris Co., Walkerville, Ont.

ELEVATOR, ENCLOSURES

Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton

ELEVATOR WEIGHTS

Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS

Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis.
Williams & Wilson, Ltd., Montreal, Que.

ELEVATING AND CONVEYING MACHINERY

Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMBOSSING PRESSES

Oliver Machinery Co., Grand Rapids, Mich

EMERY GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS

Brantford Emery Wheel Co., Brantford, Canada
The Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMERY WHEEL DRESSINGS

Wheel Trueing Tool Co., Windsor, Ont.

END MILLS

John Morrow Screw & Nut Co., Ingersoll

ENGINES, STEAM, GAS, GASOLINE

Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL

Johnson Mach. Co., Carlyle, Manchester, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINES, MARINE

Can. Ingersoll-Rand Co., Sherbrooke, Que.

ENGRAVERS

Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS

Parmenter & Bulloch, Gananoque, Ont.

EXHAUST HEADS AND HOODS

Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.

EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Williams & Wilson, Ltd., Montreal, Que.

EXTRACTORS, TAP

Walton Co., The, Hartford, Conn.

EYE BOLTS AND NUTS

Can. Foundries & Forgings, Ltd., Welland, Ont.

EYE PROTECTORS

Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.

FACTORY GATES

Page Steel & Wire Co., Adrian, Mich.

FANS

Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.

FENCING, WIRE

Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

FENCE, IRON AND FACTORY

Can. Wire & Iron Goods, Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN

Vanadium-Alloys Steel Co., Pittsburgh, Pa

FILES

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son Toronto, Ont
Standard Machy. & Supplies, Montreal.
Simonds Mfg. Co., Fitchburg, Mass.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL

Bowser & Co., S. F., Fort Wayne, Ind.
Can. Wire & Iron Goods, Hamilton, Ont.

FIRST AID CABINETS

Strong, Kennard & Nutt Co., Cleveland.

FIRE BRICKS

Harbison-Walker Refractories Co., of Canada, Montreal, Que.

FIRE EXTINGUISHERS

Strong, Kennard & Nutt Co., Cleveland, O.

FIXTURES

Brown Engineering Corp., Toronto, Ont.
Crescent Machine Co., Ltd., Montreal.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLEXIBLE SHAFT COILING MACHINERY

Sleeper & Hartley, Inc., Worcester, Mass.

FLAT SPRINGS

The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS

Wickes Bros., Saginaw, Mich.

FORGES, HAND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.

FORGINGS, STEEL AND IRON

Can. Found. & Forgings, Ltd., Welland.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE FORGING AND WELDING

Victoria Foundry Co., Ottawa.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamp'g Co., Walkerville.
Steel Co. of Canada, Ltd., St. Catharines.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY

John Bertram & Sons Co., Dundas, Ont.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
National Machy. Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

FORGINGS, SPECIAL

Armstrong-Whitworth of Can., Montreal.
Can. Found. & Forgings Ltd., Welland.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING

H. Hope & Sons of Can., Ltd., Peterboro

FOUNTAINS, DRINKING

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS

Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING

Can. Consolidated Rubber Co., Montreal.

FUEL OIL SYSTEMS

Bowser & Co., S. F., Inc., Fort Wayne.
Gilbert & Barker Mfg. Co., Springfield.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING

Bellevue Furnace Co., Detroit, Mich.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield.
Mechanical Eng'r'g Co., Three Rivers, Q.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

FURNACES, BLAST

Bellevue Industrial Furnace Co., Detroit.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING

Gilbert & Barker Mfg. Co., Springfield.
Standard Fuel Engr. Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL,

Standard Fuel Engr. Co., Detroit, Mich.

FURNACES, LEAD AND SALT

Standard Fuel Engr. Co., Detroit, Mich.

FURNACES, RIVETING

Standard Fuel Engr. Co., Detroit, Mich.

FUSE BOXES, STEEL

Dom. Forge & Stamp. Co., Walkerville.

GANG PLANER TOOLS

Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.

Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS

Bowser & Co., S. F., Inc., Fort Wayne.

GASOLINE TANKS

Bowser & Co., S. F., Inc., Fort Wayne.

GASOLINE PUMPS, SELF-MEASURING

Bowser & Co., S. F., Inc., Fort Wayne.

GAUGES

Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGERS, CALIPERS

Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT

Taylor Instrument Co., Rochester, N.Y.

GAUGES, HYDRAULIC

Taylor Instrument Co., Rochester, N.Y.

GAUGES, MANUFACTURERS, LIMIT, THREAD

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Can., Galt, Ont.

GAUGES, STANDARD

Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto
Toronto Tool Works, Toronto, Ont.
Wells Brothers Co. of Canada, Galt, Ont.
Wood, Engineering Co., Toronto, Ont.

GAUGES, THREAD

Bicknell-Thomas Co., Greenfield, Mass.

GAUGES, VACUUM AND PRESSURE

Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAUGES, SNAP, THREAD AND CYLINDRICAL

C. E. Johanson, Inc., Toronto, Ont.

GEAR BLANKS

Can. Steel Foundries, Ltd., Montreal.
Dom. Found. & Steel, Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST

Katie Foundry, Galt, Ont.

GEAR SHAPERS AND CUTTERS

Fellows Gear & Shaper Co., Springfield, V.

GEAR-CUTTING MACHINERY

Bilton Mach. Tool Co., Bridgeport, Conn.
Fellows Gear & Shaper Co., Springfield, V.
Garlock-Walker Mchy Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE

Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL

Bridgeford Mach. Tool Wks, Rochester.

GEAR BOXES, REDUCTION

Coventry Chain Co., Coventry, Eng.

GEARS, CHAIN

Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING

Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE, WORM

Baxter & Co., Ltd., J. R., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Found., Ltd., Hull, Q.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE

Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia.
A. R. Williams Machy. Co., Toronto.

GENERATORS, GEAR

Fellows Gear & Shaper Co., Springfield, V.

GEARS, SPRING

Morse Chain Co., Ithaca, New York.

GEARS, SILENT CHAIN GENERATORS, STEAM TURBO

Can. General Electric Co., Toronto, Ont.

GENERATORS AND CONVERTORS

Can. General Electric Co., Toronto, Ont.

GENERATORS, MOTOR

A. R. Williams Machry. Co., Toronto.
Williams & Wilson, Ltd., Montreal.
MacGovern & Co., Montreal.

GERMAN SILVER

Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLOVES, ASBESTOS, ACID PROOF, WATERPROOF, ETC.

Strong, Kennard & Nutt Co., Cleveland.

GLUE HEATERS

Oliver Machinery Co., Grand Rapids, Mich

GLASSES, SAFETY

Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL

Wilson & Co., J. C., Belleville, Ont.

GRAPHITE

Aikenhead Hardware, Ltd., Toronto.
Rice Lewis & Son, Toronto.

GOGGLES

Consolidated Optical Co., Toronto.
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.
Welding & Supplies Co., Montreal.

GRAVITY CARRIERS

Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS

Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (See Lubricants)

GRINDERS, AUTOMATIC KNIFE

W. H. Banfield & Son, Toronto
Canada Machinery Corp., Galt, Ont.
Foss Mchry. & S'ply Co., G. F., Montreal
Garlock-Walker Machinery Co., Toronto.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH

Wisconsin Electric Co., Inc., Racine, Wis.
Blake & Johnson Co., Waterbury, Conn.
Can. Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co., Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Katie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Elec. Tool Co., Cincinnati.
Williams & Wilson, Limited, Montreal.

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I
Cincinnati Milling Mach. Co., Cincinnati.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, M.
Heald Machine Co., Worcester, Mass.

Landis Tool Co., Waynesboro, Pa
LeBlond Mch. Tool Co., R. K., Cincinnati
Norton Grinding Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, DIE AND CHASER

Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK

Armstrong Bros. Tool Co., Chicago, Ill.
Ford-Smith Mach. Co., Hamilton.
Gardner Machine Co., Belott, Wis.
Heald Machine Co., Worcester, Mass.

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
United States Elec. Tool Co., Cincinnati.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal.

GRINDERS, CYLINDER, INTERNAL

Brown & Sharpe Mfg. Co., Providence, R.I
Foss Mchy. & S'ply. Co., G. F., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH

Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I
Cincinnati Electrical Tool Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Grant Mfg. & Mach. Co., Bridgeport, Conn
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago.
United States Elec. Tool Co., Cincinnati.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, HOLE, HOLE AND FACE AND DEEP HOLE

Bryant Chucking Grinder Co., Springfield, Vermont.

GRINDERS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co., Toronto.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
MacGovern & Co., Montreal, Que.

GRINDERS, ROTARY SURFACE

Bristol Machine Tool Co., Bristol, Conn.

GRINDERS, TOOL AND HOLDER

Armstrong Bros. Tool Co., Chicago.
W. F. & John Barnes Co., Rockford, Ill.
Blake & Johnson Co., Waterbury, Conn.
Blount, & Co., J. G., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I
Ford-Smith Machine Co., Hamilton, Ont.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield
National-Acme Co., Cleveland, Ohio
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Canada, Galt, Ont.

GRINDERS, UNIVERSAL, PLAIN

Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, VERTICAL, SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Grinding Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME

Can. Fairbanks-Morse Co., Montreal.
Cincinnati Elec. Tool Co., Cincinnati O.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner & Son, Robt., Montreal.
Garvin Machine Co., New York
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford, Ont.
LeBlond Mch. Tool Co., R. K., Cincinnati
Niles-Bement Pond Co., New York N.Y.
Norton Grinding Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wiss.
Williams & Wilson, Ltd., Montreal.

GRINDING MACHINES, CAR WHEEL, CUTTER. CYLINDRICAL, CRANKSHAFT

Norton Grinding Co., Worcester, Mass.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Norton Co., Worcester, Mass.

GRIT, ANGULAR

Pittsburgh Crushed Steel Co., Pittsburgh.

GUARDS, WINDOW AND MACHINE

Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods, Co., Hamilton
Dennis Wire & Iron Works, London, Ont.
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland.

HANDLES, BALANCE, CRANK AND MACHINE

Williams & Co., J. H., Brooklyn, N.Y.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Ford-Smith Machine Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Foss Mchy. & S'ply. Co., G. F., Montreal
Fry's (London), Ltd., London, England.
Racine Tool & Machine Co., Racine, Wis.
Plewes, Ltd., Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass.
Standard Machy. & Supplies, Montreal.
Victor Saw Works, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton.
Williams & Wilson, Ltd., Montreal.

HACK SAW FRAMES

Aikenhead Hardware Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal.

HACK SAWS, POWER

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Foss Mchy. & S'ply. Co., G. F., Montreal.
Ford Smith Machine Co., Hamilton.
Peerless Machine Co., Racine, Wis.
Racine Tool & Mach. Co., Racine, Wis.
Starrett Co., L. S., Athol, Mass.
Victor Saw Works, Hamilton, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.

HAMMERS (DROP), MOTOR AND BELT DRIVEN

Beaudry & Co., Boston, Mass.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton.
Can. Bulmers & Spencer, Ltd., Welland
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
Jardine & Co., A. B., Hespeler, Ont.
Niles-Bement Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Ltd., Montreal.

HAMMERS, HELVE POWER

Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

HAMMERS, MARKING

Matthews & Co., Jas. H., Pittsburgh, Pa

HAMMERS, NAIL MACHINE

Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston, Mass.

HAMMERS, STEAM

Canada Machinery Corp., Galt, Ont.
Niles-Bement Pond Co., New York.

HAND PLANERS

Oliver Mchry. Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS

Graton & Knight Mfg Co., Montreal.

HANGERS, SHAFT

Algoma Steel Corp., Sault Ste. Marie.
Can. General Electric Co., Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Can. S K F Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Jones & Glasseo, Montreal.
Standard Pressed Steel Co., Philadelphia.
Williams & Wilson, Limited, Montreal.

HARDNESS TESTING INSTRUMENTS

Shore Instrument & Mfg. Co., New York

HEAD, AUXILIARY

Hoefer Mfg. Co., Freeport, Ill.

HEATING AND VENTILATING ENGINEERS

Can. Blower & Forge Co., Kitchener, Ont.

HEAT TREATMENT OF STEEL

Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING

Shore Instrument & Mfg. Co., New York.

HELMETS, SANDBLAST, AMMONIA

Strong, Kennard & Nutt Co., Cleveland.

HIGH SPEED STEEL

See Steel.

HINGE MACHINERY

Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES

London Bolt & Hinge Wks., London, Ont.

HOBS

Greenfield Tap & Die Co., Greenfield, Mass
Illinois Tool Works, Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Wells Bros. of Canada, Galt, Ont.

HOISTS, AIR

Can. Ingersoll-Rand Co., Ltd., Sherbrooke
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

HOISTS, CHAIN AND PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Ford Chain Block & Mfg., Philadelphia.
Independent Pneumatic Tool Co., Chicago.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal.

HOISTS, ELECTRICAL

Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Electric Steels & Metals Ltd., Welland
Kennedy & Sons, Owen Sound, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.

HOLDERS, STEEL DIE FOR MARKING

Matthews & Co., Jas. H., Pittsburgh, Pa.

HOLDERS, ELECTRIC

Electric Steels & Metals, Ltd, Welland

HOOKS, BELT LACING

Clipper Belt Lacer Co., Grand Rapids.

HOPPERS

MacKinnon Steel Co., Ltd., Sherbrooke
Dominion Bridge Co., Montreal, Que
Toronto Iron Works, Ltd., Toronto, Ont

HOSE, PNEUMATIC

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto
Independent Pneumatic Tool Co., Chicago
Wells Bros. Co. of Canada, Galt, Ont.

HOSE, ALL KINDS

Int Mach. & Supply Co., Ltd., Montreal.

HOSE, SAND BLAST

Pangborn Corporation, Hagerstown, Md.

HYDRAULIC MACHINERY

Garlock-Walker Machinery Co., Toronto.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
West Tire Setter Co., Rochester, N.Y.
Victoria Foundry Co., Ottawa.
Williams & Wilson, Limited, Montreal

HYDROMETERS, HYGROMETERS, HYGRODEIKS

Taylor Instrument Co., Rochester, N.Y.

INDICATORS, SPEED

Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence
Starrett Co., L. S., Athol, Mass.

INDEX CENTRES

Dickow, Fred C., Chicago, Ill.
Ford-Smith Machine Co., Hamilton, Ont
Garvin Machine Co., New York.
Williams & Wilson, Limited, Montreal

INDICATING INSTRUMENTS

Taylor Instrument Co., Rochester, N.Y.

INGOT METAL

Brown's Copper & Brass Rolling Mills New Toronto, Ont.

INGOTS, STEEL

Nova Scotia Stl. & Coal Co., New Glasgow

INGOTS, FORGING AND ROLLING

Electric Steel & Metals Co., Welland.

INSTRUMENTS, ENGINEERING

Consolidated Optical Co., Toronto.

IRON ORE

Hanna & Co., M. A., Cleveland, O.

IRON SAND

Pittsburgh Crushed Steel Co., Pittsburgh

IRON, WROUGHT, ROLLED, PIG

Swedish Steel & Impt. Co., Ltd., Montreal

JACKS

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Fellows Bros., Ltd., Chadley Heath, Eng.
Morris Crane & Hoist Co., Herbert
Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Rice Lewis & Son, Toronto, Ont
Williams & Wilson, Limited, Montreal.

JACKS, SCREW AND HYDRAULIC

Fellows Bros., Ltd., Chadley Heath, Eng.

JACKS, PIT AND TRACK

Canadian Fairbanks-Morse Co., Montreal
Northern Crane Works, Walkerville.

JAWS, FACE PLATE

Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JOINTERS

Gray Ball Bearing Co., Ltd., Toronto.

JIGS, TOOLS, ETC.

Brown Engineering Corp., Toronto.
Elliott & Whitehall Mach. & Tool Co., Galt.
Gisholt Machine Co., Madison, Wis.
Homer & Wilson, Hamilton, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ont.
Toronto Tool Co., Toronto, Ont.

JOURNAL WEDGES

Canada Foundries & Forgings, Welland.

KEY SEATERS

Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, M.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal.

KEYS, MACHINE

Whitney Mfg. Co., Hartford, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

KILNS

Can. Blower & Forge Co., Kitchener, Ont.
Kennedy & Sons, Wm., Owen Sound, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

KNIFE GRINDERS

Gray Ball Bearing Co., Ltd., Toronto.

LABELS AND TAGS

Matthews & Co., Jas. H., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (See Chemists)

LADLES, FOUNDRY

Northern Crane Works, Walkerville.

LACING MACHINES

Clipper Belt Lacer Co., Grand Rapids, M.

LAMPS, ARC, INCANDESCENT

Can. General Electric Co., Toronto, Ont.

LAMPS, TUNGSTEN AND NITRO

Can. General Electric Co., Toronto, Ont.

LAG SCREW GIMLET POINTERS

National Machy. Co., Tiffin, Ohio.

LATHES, CHUCKING

Acme Machine Tool Co., Cincinnati, Ohio
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Limited, Montreal.

LATHE CHUCKS (See Chucks)
LATHE DOGS AND ATTACHMENTS

Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Williams & Co., J. H., Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC

Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE

Bridgeford Mach. Tool Works, Rochester.

LATHES, BORING

Bridgeford Mach. Tool Works, Rochester.
Lodge & Shipley, Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, PRECISION, BENCH

W. F. & John Barnes Co., Rockford.
J. G. Blount & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal.
Geo. F. Foss Machy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Hardinge Bros., Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, BRASS

Acme Machine Tool Co., Cincinnati, Ohio.
Hardinge Bros., Chicago, Ill.
Lodge & Shipley, Cincinnati, O.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, ENGINE

Acme Machine Tool Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Bridgeford Mach. Tool Wks., Rochester.
Canada Mach'y Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cisco Machine Tool Co., Cincinnati, Ohio.
Wickes Bros., Saginaw, Mich.
G. F. Foss Mchy. & S'ply Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Gisholt Machine Co., Madison, Wis

Kennedy & Sons, Wm., Owen Sound, Ont.
R. McDougall Co., Galt.
Niles-Bement-Pond Co., New York.
Smalley-General Co., Inc., Bay City, Mich.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Standard Machy. & Supplies, Montreal.
Sidney Tool Co., Sidney, Ohio.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Worcester Lathe Co., Worcester, Mass.

LATHES, FOOT POWER
Seneca Falls Mfg. Co., Seneca Falls, N.Y.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, JOURNAL TRUEING
Bridgeford Mach. Tool Works, Rochester.

LATHES, PATTERNMAKERS'
J. G. Blount Co., Everett, Mass.
Can. Machinery Corp., Galt.
Wood Turret Machine Co., Brazil, Ind.
G. F. Foss Mchy. & S'ply Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, POLISHING
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, SCREW CUTTING
Bertram & Sons Co., John, Dundas, Ont.
Bridgeford Mach. Tool Works, Rochester.
Canada Machinery Corp., Galt, Ont.
Cisco Machine Tool Co., Cincinnati, O.
Foss Mchy. & S'ply Co., G. F., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Hardinge Bros., Inc., Chicago, Ill.
Hepburn Ltd., John T., Toronto, Ont.
Niles-Bement-Pond Co., New York
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb Blaisdell Mach. Tool Co., Worcester, Mass.
Wickes Bros., Saginaw, Mich.
Williams Machy. Co., A. R., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Worcester Lathe Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, SPINNING
Bliss Co., E. W., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, TOOL ROOM
Cisco Machine & Tool Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Worcester Lathe Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

LEAD BURNING
St. Lawrence Welding Co., Montreal.

LEAD BURNING OUTFITS
Turner Brass Works, Sycamore, Ill.

LEATHER STRAPPING
Graton & Knight Mfg. Co., Worcester, M.

LENSES FOR GOGGLES
Standard Optical Co., Geneva, N.Y.

LIDS, SCREW TOP AND HINGE
Can. Winkley Co., Ltd., Windsor, Ont.

LINK BELTING
See Belting, Chain.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Gds. Co., Hamilton.
Dennis Wire & Iron Works, London, Ont.

LUBRICANTS
Cataract Refining & Mfg. Co., Toronto.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bowser & Co., S. F., Inc., Fort Wayne.

LUBRICATORS
Trabern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
Thos. Pink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox Southington, Conn.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Standard Machy. & Supplies, Montreal.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY GUARDS (See Guards)

MANDRELS
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Jardine & Co., A. B., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co. of Can., Ottawa.
Matthews & Co., Jas. H., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Perrin, Wm. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne.

MEASURING TAPES AND RULES
Chesterman & Co., Jas., Sheffield, Eng.

METALLURGISTS
See Chemists.

METAL SAWS
See Saws.

METAL SAWS, POWER
Hoefer Mfg. Co., Freeport, Ill.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.

METAL, STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., Ashburnham, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

MILLING ARBORS
Kearney & Trecker Co., Milwaukee, Wis.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram & Sons Co., John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Foss Mchy. & S'ply Co., G. F., Montreal.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Cleveland Milling Machine Co., Cleveland.
Kearney & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Gooley & Eglund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati.
Whitney Mfg. Co., Hartford, Conn.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Can. General Electric Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
Williams Mach'y Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY.
Nat. Automatic Tool Co., Richmond, Ind.

MUNTZ METAL
Brown's Copper & Brass Roller Mills, New Toronto, Ont.

NAIL SETS
Morrow Screw & Nut Co., J., Ingersoll, Ont

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews & Co., Jas. H., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Ont.
Turner Brass Works, Sycamore, Ill.

NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville.

NICKEL
Boker & Co., Inc., H., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.

NICKEL SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

NICKEL STEEL
See Steel.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
Hall & Sons, Ltd., John H., Brantford.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS, STEEL, CASTELLATED AND COLD PRESSED
Morrow Screw & Nut Co., J., Ingersoll, Ont
Williams & Co., J. H., Brooklyn, N.Y.

NUTS, SEMI-FINISH AND FINISHED
Gaat Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Wilkinson & Kompass, Hamilton.

NUT BURRING AND NUT MACHINES (HOT)
National Machy. Co., Tiffin, Ohio.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

NUT TAPPERS
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Hall & Son, J. H., Brantford, Ont.
Jardine & Co., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

OIL STONE GRINDERS
Oliver Machy. Co., Grand Rapids, Mich

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OPENING DIE HEADS
Greenfield Tap & Die Corp, Greenfield.
Wells Bros. of Canada, Galt, Ont.

OPTICAL SUPPLIES
Consolidated Optical Co., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford.
MacKinnon Steel Co., Sherbooke, Que.

OVENS FOR DRYING, TEMPER AND OXYGEN, ELECTROLYTIC CELLS UNDER TRUCKS
Welding & Supplies Co., Montreal, Que.
Brantford Oven & Rack Co., Brantford.

OXY-ACETYLENE WELDING AND CUTTING AND OUTFITS
Carter Welding Co., Toronto, Ont.
Prest-o-Lite Co., Inc. Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.
Welding & Supplies Co., Montreal, Que.

PACKINGS, ASBESTOS
Cleveland Wire Spring Co., Cleveland.

PACKINGS, LEATHER, HYDRAULICS, ETC.
Graton & Knight Mfg. Co., Worcester, M.
Perrin, Ltd., William, Toronto.

PANS, WET AND DRY
Frost Mfg. Co., Chicago, Ill.

PAPER MILL CONVEYORS AND DRIVES
Bertrams, Ltd., Edinburgh, Scotland.
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

PARTITIONS, WIRE
See Guards

PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Oliver Machy Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PATTERN MAKERS' LATHES
See Lathes.

PATENT SOLICITORS
Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
Wilson & Co., J. C., Belleville, Ont.
Greenleafs, Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

PECK CARRIERS FOR POWER PLANTS
Can. Link-Belt Co., Toronto, Ont.

PERFORATED METALS AND ORNAMENTAL IRON GOODS
Canada Wire & Iron Goods Co., Hamilton

PIG IRON
Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PINS, TAPER
Morrow Screw & Nut Co., J., Ingersoll, Ont

PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids.

PIPE FITTINGS, MALLEABLE AND CAST IRON
International Malleable Iron Co., Guelph.

PIPE CUTTING AND THREADING MACHINES
Butterfield & Co., Rock Island, Que.

Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, John H., Brantford.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
McDougall Co., R., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PHOTOSTATS

Commercial Camera Co., Providence, R.I.

PIPE RIVETED STEEL

Toronto Iron Works, Ltd., Toronto.

PIERCING

Oliver Machy. Co., Grand Rapids, Mich.

PIPE CUTTERS, ROLLING

Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, Ltd., John H., Brantford.
Wells Bros. Co. of Canada, Galt, Ont.

PIPE TOOLS AND DIES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE CUTTERS AND REAMERS

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE STOCKS AND THREADERS

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE TAPS AND VISES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE WRENCHES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PISTON RODS, ROUGH TURNED

General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES

National Acme Co., Windsor, Vt.

PLANER BOLTS

Morrow Screw & Nut Co., J., Ingersoll, Ont

PLANER JACKS

Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY

Betts Machine Co., Rochester, N.Y.
Bertram & Sons Co., John, Dundas.
Oliver Machy. Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner & Son, Robt., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich
Niles-Bement-Pond Co., New York.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

PLANING AND SHAPING MACHINERY

Canada Machinery Corp., Galt, Ont.
Can. Fairbanks Morse Co., Montreal
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PLANER-SHAPER, COMBINED OPEN SIDE

Lynd-Farquhar Co., Boston.
Williams & Wilson, Ltd., Montreal, Que.

POWER HAMMERS

Quickwork Co., St. Marys, Ohio.

PLANING MILL EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto.
Can. Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Ct.
Rice Lewis & Son, Toronto, Ont.

PNEUMATIC TOOLS

Can. Ingersoll Rand Co., Montreal, Que.
Cleveland Pmatic Tool Co., Can., Toronto.
Curtis Pneumatic Machy. Co., St. Louis.
Garlock Walker Machy. Co., Toronto.
Int. Mach. & Supply Co., Ltd., Montreal.
Independent Pneumatic Tool Co., Chicago.

POWER CRANES, HAND

MacKinnon Steel Co., Sherbrooke, Que.

POLISHING MACHINES

Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POLISHING PLATES

Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POWER HOUSE CONVEYORS

Can. Link Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

POWER TRANSMISSION MCHY.

Williams & Wilson, Ltd., Montreal, Que.

PRESSED STEEL PARTS

Gray Ball Bearing Co., Ltd., Toronto.

PRESSERS, ARBOR

Atlas Press Co., Kalamazoo, Mich.
Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BROACHING, FORGING AND FLANGING

Atlass Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, FILTER

Perrin, Ltd., William R., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING

Banfield & Son, W. H., Toronto.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co, Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, HYDRAULIC

Bertram & Sons Co., John, Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Standard Machy. & Supplies, Montreal.
West Tire Setter Co., Rochester, N.Y.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING

Perrin, Ltd., William R., Toronto.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich
Garlock-Walker Machinery Co., Toronto.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams Machy. Co., A. R. Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT

Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SCREW

Barnes & Co., W. F. & Jno., Rockford, Ill
Bliss Co., E. W., Brooklyn, N.Y.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, TRIMMING

Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PROPELLERS

Kennedy & Sons, Wm., Owen Sound.

PSYCROMETERS, SLING

Taylor Instrument Co., Rochester, N.Y.

PULLEYS

Algoma Steel Corp., Sault Ste. Marie, Ont
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Kennedy & Sons, Ltd., W., Owen Sound.
Positive Clutch & Pulley Works Ltd., Toronto
Standard Mach. & Supplies, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, STEEL SASH, STEEL BELT

American Pulley Co., Philadelphia, Pa.

PULLEYS, FRICTION, CLUTCH

American Pulley Co., Philadelphia, Pa
Curtis Machine Co., Bridgeport, Conn
Bernard Industrial Co., A., Fortierville, Q
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mch. Co., Manchester, Ct
Positive Clutch & Pulley Works, Toronto.
Jones & Glassco, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

PULP MILL MACHINERY

MacKinnon Steel Co., Sherbrooke, Que.

PUMPS, CENTRIFUGAL

Bowser & Co., Inc., S. F., Toronto.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont
Williams & Wilson, Ltd., Montreal, Que

PUMPS, FUEL OIL

Bowser & Co., Inc., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED

Darling Bros., Ltd., Montreal, Que.

PUMPS, HIGH PRESSURE

Perrin, Ltd., William R., Toronto.

PUMPS HYDRAULIC

Garlock-Walker Machinery Co., Toronto.
Darling Bros., Ltd., Montreal, Que.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, LUBRICATING, OIL STORAGE

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, RUBBER CEMENT

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, KEROSENE, OIL, SELF MEASURING

Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, LUBRICANT, OIL, WATER

Darling Bros., Ltd., Montreal, Que.
Fry's (London), Ltd., London, England.
Trahern Pump Co., Rockford, Ill.

PUMPS, SUD

Fry's (London), Ltd., London, England.

PUMP LEATHERS

Graton & Knight Mfg. Co., Worcester.

PUNCHES AND DIES

Atkins & Co., Ltd., Wm., Sheffield, Eng.
W. H. Banfield & Sons, Toronto.
E. W. Bliss Co. Brooklyn, N.Y.
Boker & Co., Inc., H, Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner & Son, Robert, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Marshall, Son & Blunney, Toronto.
Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Ct.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHES, HAND

Peck, Stow & Wilcox Co., Southington, Ct.

PUNCHES, POWER

John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd, Hamilton, Ont.
Canada Machinery Corp., Galt, Ont
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
A. B. Jardine & Co., Hespeler, Ont.
Long & Allstatter, Hamilton, Ohio
Niles-Bement-Pond Co., New York.
D. H. Stoll Co., Buffalo, N.Y.
Wickes Bros., Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHING MACHINES, HORIZONTAL

Bertrams, Ltd., Edinburgh, Scotland.
Bertrams & Sons, John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton, Ont.
Garlock-Walker Mach'y. Co., Toronto.
Niles-Bement-Pond Co., New York.
Wickes Bros., Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PYROMETERS

Bristol Co., Waterbury, Conn.
Shore Instrument & Mfg. Co., New York.
Taylor Instrument Co., Rochester, N.Y.

QUARTERING MACHINES

Bertram & Sons, John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

RAIL BENDERS

Algoma Steel Corp., Sault Ste. Marie, O.
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS

Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal, Que.

RASPS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto
John Morrow Screw & Nut Co., Ingersoll.

RATCHETS

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Keystone Mfg. Co., Buffalo, N.Y.
Marshall, Son & Bunney, Toronto

RAWHIDE PINIONS (See Gears)

REAMERS, ADJUSTABLE

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Greenfield Tap & Die Corp., Greenfield
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
The Kelly Reamer Co., Cleveland, O.
J. A. M. Taylor, 318 Stair Bldg., Toronto.
Standard Mach. & Supplies, Montreal.
Wells Bros. of Can., Galt, Ont
Whitman & Barnes Co., St. Catharines.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Aikenhead Hardware Co., Toronto.
J. Boker & Co., Inc., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, STEEL TAPER AND SELF-FEEDING

Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, CHUCKING

Atkins & Co., Ltd., Wm., Sheffield, Eng.
Greenfield Tap & Die Corp., Greenfield.
Marshall, Son & Bunney, Toronto.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, HAND

Greenfield Tap & Die Corp., Greenfield.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMERS, PIN

Greenfield Tap & Die Corp., Greenfield.
Morrow Screw & Nut Co., John, Ingersoll.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMER FLUTING MACHINES

Garvin Machine Co., New York.

REAMING MACHINES, PNEUMATIC

Cleveland Pneumatic Co. of Can., Toronto
Garlock-Walker Machinery Co., Toronto.

RECORDING INTRUMENTS

Bristol Co., Waterbury, Conn.
Gisholt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REELS, WIRE AND TEXTILE MFG.

American Pulley Co., Philadelphia, Pa.

REGULATORS, AUTOMATIC

Electric Steels & Metals, Ltd., Welland.

REGULATORS, PRESSURE, TEMPERATURE

Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS

Strong, Kennard & Nutt Co., Cleveland.

RIVETS,

Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto.
Steel Co. of Canada, Ltd., Hamilton.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION

Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC, ROTARY BLOW

Grant Mfg. & Machine Co., Bridgeport.
High-Speed Hammer Co., Rochester.
Williams & Wilson, Ltd., Montreal.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT

Can. Ingersoll-Rand Co., Ltd., Sherbrooke.

RODS, ROPE AND SPRING

General Steel Co., Milwaukee.
Page Steel & Wire Co., Adrian, Mich.

RODS, PURE NICKEL, MONEL METAL, NICHROME

Can. Driver-Harris Co., Ltd., Walkerville.

ROLLER CHAINS

Can. Link-Belt Co., Toronto.
Jones & Glassco, Montreal.

ROLLS, BENDING, STRAIGHTENING

John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton.
Can. Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

ROPE, GALX, MONEL METAL, BRONZE, TILLER AND SASH CORD

Can. Driver-Harris Co., Ltd., Walkerville.

ROTARY SHEARS

The Quickwork Co., St. Mary's, Ohio.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland.

ROLLS, CRUSHING
Can. Link-Belt Co., Toronto.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto.

RUBBER MILL MACHINERY
Bertrams Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield.
Rice Lewis & Son, Toronto.
L. S. Starrett Co., Athol, Mass.

RULES, STEEL, STRAIGHT, AND FOLDING
Lufkin Rule Co. of Can., Windsor.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor.

SAW MILL CONVEYORS
Can. Link-Belt Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SAFETY DEVICES
Strong, Kennard & Nutt Co., Cleveland.

SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT SAND BLAST SUPPLIES AND ACCESSORIES
Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland.

SAFETY APPLIANCE GOGGLES
T. A. Willson Co., Inc., Reading, Pa.

SAND BLAST ABRASIVES
Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh.

SAND MIXING MACHINERY
Frost Mfg. Co., Chicago, Ill.

SANITARY DRINKING FOUNTAINS
Puro Sanitary Drinking Fountain Co., Haydenville.

SANDERS, DISC AND SPINDLE
Can. Sander Mfg. Co., Brockville, Ont.

SANDING MACHINES
Canada Machinery Corp., Galt.
Can. Sander Mfg. Co., Brockville, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt.
Robert Gardner & Son, Montreal
Curtis Pneumatic Machy Co., St. Louis.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SASH SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

SAWS, CIRCULAR METAL
Wm. Atkins & Co., Ltd., Sheffield, Eng.
Hunter Saw & Machine Co., Pittsburgh.
Marshal, Son & Bunney, Toronto
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburgh, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (See Hack Saws)

SAW SHARPENERS
Greenfield Tap & Die Corp., Greenfield.
Hunter Saw & Machine Co., Pittsburgh.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING
J. A. M. Taylor, Stair Bldg., Toronto.

SCALES, MECHANICS'
Lufkin Rule Co. of Can., Windsor.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York

SCREENING MACHINERY
Can. Link-Belt Co., Toronto.

SCREW EXTRACTORS
Cleveland Twist Drill Co., Cleveland

SCREW MACHINES, HAND, AUTOMATIC
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks Morse Co., Montreal
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
A. B. Jardine & Co., Hespeler
National Acme Co, Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

SCREWS, MACHINE, SET, CAP AND SPECIAL
Galt Machine Screw Co., Galt.
John Morrow Screw & Nut Co., Ingersoll.
National Acme Co., Montreal.
Rice Lewis & Son, Toronto
Steel Co. of Canada, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton.

SCREW COLLARS
Galt Machine Screw Co., Ltd., Galt, Ont.
John Morrow Screw & Nut Co., Ingersoll.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
Greenfield Tap & Die Corp., Greenfield.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto
J. A. M. Taylor, Stair Bldg., Toronto.
Wells Bros. of Can., Galt
Wilkinson & Kompass, Hamilton

SCREWS, SAFETY SET
Galt Machine Screw Co., Ltd., Galt, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York.
National Acme Co., Cleveland, O.
Pratt & Whitney Co., Dundas, Ont.

SEPARATORS, MOISTENERS AND OIL FOR COMPRESSED AIR
Pangborn Corporation, Hagerstown, Md.

SELF-OPENING DIES
See Dies.

SEPARATORS, SAND
Pangborn Corporation, Hagerstown, Md.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto.
Bristol Co., Waterbury, Conn.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wilkinson & Kompass, Hamilton.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt.
Geo. F. Foss Mchy. & Sply. Co., Montreal
Robt. Gardner & Son, Montreal.
Garlock-Walker Machy. Co., Toronto.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton.
Williams & Wilson, Ltd., Montreal.

SHAPERS, GEAR
Fellows Gear & Shaper Co., Springfield, V.

SHAFTING
Algoma Steel Corp., Sault Ste. Marie, O.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy. Co., Ltd., Toronto
Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton.
Pratt & Whitney Co., Dundas.
Rice, Lewis & Son, Toronto.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

SHARPENING STONES
Norton Co, Worcester, Mass.
Rice, Lewis & Son, Toronto.

SHEARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas.
Bertrams Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto
A. B. Jardine & Co., Hespeler, Ont.
Niles Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

SHEARS, POWER
John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton.
Can Blower & Forge Co, Kitchener.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto
Long & Allstatter, Hamilton, Ohio.
Wickes Bros., Saginaw, Mich.
A. B. Jardine & Co., Hespeler, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York
H. D. Stoll Co., Inc., Buffalo, N.Y.
Toledo Machine & Tool Co, Toledo, O
Williams & Wilson Ltd., Montreal, Que.

SHEARS, ROTARY
The Quickwork Co., St. Mary's, Ohio

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

SHEET METAL ROLLING MACHINES
Peck, Stow & Wilcox Co., Southington.

SHEETS, NICKEL, RESIST. ALLOY
Can. Driver-Harris Co., Ltd., Walkerville.

SHEARS, PLATE CUTTING, SLITTING
Quickwork Co., St. Mary's, Ohio

SHEARS, SPLITTING
Peck, Stow & Wilcox Co., Southington

SHEARS, IRREGULAR AND CIRCLE CUTTING
The Quickwork Co., St. Mary's, Ohio.
D. H. Stoll Co., Inc., Buffalo, N.Y.

SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, C.

SHEARS, SERPENTINE
The Quickwork Co., St. Mary's, Ohio.

SHEARS, SQUARING
Brown, Boggs & Co., Hamilton, Ont.
D. H. Stoll Co., Inc., Buffalo, N.Y.

SHEET METAL WORKING TOOLS
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton.
Peck, Stow & Wilcox Co., Southington C.
D. H. Stoll Co., Inc., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal.

SHEETS, CRUCIBLE, CAST
Kayser-Ellison & Co., Ltd., Montreal.
Ralph B. Norton, Agent, Montreal.

SHEET METAL WORKING MACHINERY
D. H. Stoll Co., Inc., Buffalo, N.Y.

SHELVING, STEEL
Dennis Wire & Iron Works, London.

SHIPYARD MACHINERY, SHOP FURNITURE
Dennis Wire & Iron Works, London.

SIDE TOOLS
Armstrong Bros. Tool Co., Chicago.
J. H. Williams & Co., Brooklyn, N.Y.

SILENT CHAINS
Can. Link Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLEDGES
Aikenhead Hardware Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SLEDGES, CAST IRON
Katie Foundry, Galt, Ont.

SLINGS, CHAINS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

SLOTTERS
Betts Machine Co., Rochester, N.Y.
Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.

SMOKESTACKS
MacKinnon Steel Co., Sherbrooke, Que

SNIPS, TINNERS AND SHEET METAL WORKERS
Kearney & Trecker Co., Milwaukee, Wis.
J. Morrow Screw & Nut Co., Ingersoll, Ont.

SOCKETS
Brown & Sharpe Mfg. Co., Providence.
Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto. Ont.
Whitman & Barnes Mfg. Co., Akron, O.

SOIL PIPE FITTINGS, CAST IRON
Katie Foundry, Galt, Ont.

SOLDERING IRONS
Aikenhead Hardware Co., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.

SOLDER
Aikenhead Hardware Co., Toronto, Ont.
Canada Metal Co., Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.

SPEED REDUCING GEARS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.

SLICING CLAMPS
Peck, Stow & Wilcox Co., Southington, Conn.

SPRINGS, MACHINERY
Barnes, Wallace Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal.
Cleveland Wire Spring Co., Cleveland.
Dunbar Bros. Co., Bristol, Conn.
Garlock-Walker Machinery Co., Toronto.
Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY
Baird Machine Co., Bridgeport, Conn.
Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Canada.
Brown Engineering Corp., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Garvin Machine Co., New York.
Godley & Ellimd, Inc., Courtland, N.Y.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Katie Foundry, Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Marten Machine Co., Hamilton, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.
Stoll Co., D. H., Buffalo, N.Y.
Victoria Foundry Co., Ottawa, Ont.
Wilson & Co., J. C. Belleville, Ont.
William R. Perrin, Ltd., Toronto.
Windsor Mach. & Tool Co., Windsor, Ont.

SPRING COILING AND WINDING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
Baird Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRINGS, SPIRAL, TOOL
The Dunbar Bros. Co., Bristol, Conn.

SPROCKETS, COMPENSATING
Morse Chain Co., Ithaca, New York

SPROCKETS, SPRING
Morse Chain Co., Ithaca, New York.

SPROCKETS, CHAIN
Can. Link-Belt Co., Toronto, Ont.
Grant Gear Works, Boston, Mass.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia.
Wilson & Co., J. C., Belleville, Ont.

SPRINGS FOR TOYS AND ELECTRIC DEVICES
The Dunbar Bros. Co., Bristol, Conn.

SPROCKET WHEELS, CAST
Can. Link-Belt Co., Toronto, Ont.
Perrin, Wm. R., Toronto.
Wilson & Co., J. C., Belleville, Ont.

SPROCKET WHEELS, CHILLED THREAD
Katie Foundry, Galt, Ont.

SQUARES
Peck, Stow & Wilcox Co., Southington, Conn.

SAFETY CYLINDERS
Oliver Mach. Co., Grand Rapids, Mich.

SANDERS
Oliver Mach. Co., Grand Rapids, Mich.

SAW BENCHES
Oliver Mach. Co., Grand Rapids, Mich.

SAW GUARDS
Oliver Mach. Co., Grand Rapids, Mich.

SAWS SWING
Oliver Mach. Co., Grand Rapids, Mich.

STAYBOLT TOPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

STAIRS, IRON
Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS, SHEET BRASS, COPPER, ALUMINUM AND STEEL
Dom. Forge & Stamping Co., Walkerville
Hope & Sons, Henry, of Canada, Peterboro, Ont.
Homer & Wilson, Hamilton, Ont.

STAMPING MACHINERY
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs, & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H & Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

SAFETY CYLINDERS
Oliver Mach. Co., Grand Rapids, Mich.

STAPLE MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

STEAM APPLIANCES
Darling Bros., Ltd., Montreal, Quebec.

STEAM SEPARATORS AND TRAPS
Can. Fairbanks-Morse Co., Montreal.

STEEL BALLS
See Balls Steel.

STEEL, CRUCIBLE TOOL
Atkins & Co., Ltd., Wm. Sheffield, Eng.
Illingworth Steel Co., John, New York.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall Son & Bunney, Toronto
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, CARBON, FERRO-TUNGSTEN
Armstrong, Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent Montreal
Latrobe Electric Steel Co., Latrobe, Pa
Vanadium-Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL CHROME VANADIUM
General Steel Co., Milwaukee, Wis
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Atkins & Co., Ltd., Wm. Sheffield, Eng
Marshall, Son & Bunney, Toronto.

STEEL CHROME NICKEL
General Steel Co., Milwaukee, Wis
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.

STEEL CASTINGS
Joilette Steel Co., Montreal, Que.
Kennedy & Sons, Wm., Owen Sound.
Electric Steel & Metals Co., Welland.
Nova Scotia Steel & Coal Co., Windsor.
Swedish Crucible Steel Co., Windsor.

STEEL, COLD ROLLED
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Can. Drawn Steel Co., Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.

Norton, Ralph B., Agent, Montreal.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co. Ltd., Montreal.
Union Drawn Steel Co., Hamilton, Ont.

STEEL, NICKEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Firth & Sons, Thos., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Vulcan Crucible Steel Co., Aliquippa, Po.

STEEL, HIGH SPEED
Armstrong-Whitworth of Can., Montreal.
Wm. Atkins & Co., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal
H. A. Drury Co., Ltd., Montreal.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Illingworth Steel Co., J., New York.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall, Son & Bunney, Toronto, Ont.
Plewes, Ltd. Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.

STEEL, GRIT
Pittsburgh Crushed Steel Co., Pittsburgh.

STEEL, CHROME, MANGANESE
Joilette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh.

STEEL, ROCK DRILL
Armstrong, Whitworth of Canada, Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

STEEL, STRUCTURAL
Algoma Steel Corp., Sault Ste. Marie.

STEEL, TOOL
Armstrong, Whitworth of Can., Montreal.
Atkins & Co., Wm., Sheffield, Eng.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
General Steel Co., Milwaukee, Wis.
Drury Co., H. A., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto, Ont.
Norton, Ralph B., Agent, Montreal.
Latrobe Electric Steel Co., Latrobe, Pa.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa.

STEEL, VANADIUM
Wm. Atkins & Co., Ltd., Sheffield, Eng.
Armstrong, Whitworth of Can., Montreal.
Drury, H. A., Co., Montreal, Que.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Vanadium-Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Wells Bros. of Can., Galt, Ont.

STOCK RACKS FOR BARS, PIPING, ETC.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

STOCKS AND DIES
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros., of Can., Galt, Ont.

STOCKS, PIPE
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Wells Bros., Co., of Canada, Galt, Ont.

STRAIGHTENING MACHINERY
Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

STRAND
Page Steel & Wire Co., Adrian, Mich.

SWITCHBOARDS
Can. General Electric Co., Toronto, Ont.

SWITCHES, RAILWAY
Can. Steel Foundries, Ltd., Montreal.

TABLES, SAND-BLAST
Panghorn Corporation, Hagerstown, Md.

TACK (DOUBLE POINT) MACHINES
Sleeper & Hartley, Inc., Worcester, Mass.

TAPPING MACHINES (PNEUMATIC)
Cleveland Pneumatic Tool Co., Toronto.

TANKS, GASOLINE, KEROSENE AND OIL
S. F. Bowser & Co., Inc., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamping Co., Walkerville.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Marshall, Son & Bunney, Toronto.

TANKS, LUBRICATING, OIL STORAGE
S. F. Bowser & Co., Inc., Fort Wayne.

TANKS, RUBBER CEMENT
S. F. Bowser & Co., Inc., Fort Wayne.

TANKS, STEEL, WATER PRESSURE
S. F. Bowser & Co., Inc., Toronto, Ont.
Dominion Bridge Co., Montreal, Quebec.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal, Que.
Toronto Iron Works, Ltd, Toronto.

TANK WAGONS
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal.
Toronto Iron Works, Ltd., Toronto.

TANKS
Can. Ingersoll-Rand Co., Ltd., Sherbrooke

TAPER PINS
Galt Machine Screw Co., Ltd., Galt, Ont.

TAPES, MEASURING
James Chesterman & Co., Ltd., Sheffield, Eng.
Rice Lewis & Son, Toronto, Ont.

TAPPING MACHINES AND ATTACHMENTS
Bertram, John & Sons Co., Dundas.
Bicknell-Thomas Co., Greenfield, Mass.
Rudel-Belnap Mach. Co., Ltd., Montreal.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Murchy Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York.
Rickert-Shafer Co, Erie, Pa.
National-Acme Co., Cleveland, Ohio.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Limited, Montreal.

TAPES, MEASURING, STEEL AND WOVEN
Lufkin Rule Co. of Can., Windsor, Ont.

TAPES, POCKET
Lufkin Rule Co. of Can., Windsor, Ont.

TAPS, ADJUSTABLE
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Geometric Tool Co., New Haven.
Modern Tool Co., Erie, Pa.
Murchey Machine & Tool Co., Detroit.
Pilot Steel & Tool Co., Montreal, Que.
Victor Tool Co., Waynesboro, Po.

TAPS, GUN, HAND, BOILER
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE RELIEVED
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, MACHINE SCREW
Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.

TAPS, PIPE
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Greenfield Tap & Die Corp., Greenfield.
Marshall, Son & Bunney, Toronto.
Wells Bros. of Can., Galt, Ont.

TAPS, STAYBOLT, TAPPER
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

TAPS, DIES AND WRENCHES
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Foss Mchy. & Sply. Co., G. F., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corp., Greenfield.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Morse Twist Drill & Mchy. Co., New Bedford, Mass.
Murchey Machine & Tool Co., Detroit.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Starrett Co., L. S., Athol, Mass.
Taylor, J. A. M., 318 Stair Bldg., Toronto.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

TAP EXTRACTORS
Walton Co., The, Hartford, Conn.

THERMOMETERS, INDUSTRIAL ENGRAVED TEMPERATURE AND PRESSURE
Taylor Instrument Co., Rochester, N.Y.

THERMOMETERS, RECORDING AND INDEX
Bristol Co., Waterbury, Conn., U.S.A.
Taylor Instrument Co., Rochester, N.Y.

TESTING INSTRUMENTS, METALLURGICAL
Shore Instrument & Mfg. Co., New York.

TENOVERS
Oliver Machy. Co., Grand Rapids, Mich.

TESTING LABORATORIES
Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Garlock-Walker Mach. Co., Ltd., Toronto.
Geometric Tool Co., New Haven.
Jardine & Co., Ltd., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt., Ont.
Williams & Wilson, Ltd., Montreal, Que.

THREADING TOOLS
Greenfield Tap & Die Corp., Greenfield.
Landis Machine Co., Waynesboro, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Canada, Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

THREADING MACHINES FOR BOLTS, NUTS AND PIPES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. Co. of Canada, Galt., Ont.
Williams & Wilson, Ltd., Montreal, Que.

THREAD MILLING MACHINES
Taft-Pierce Mfg. Co., New York, N.Y.
Gray Ball Bearing Co., Ltd., Toronto.
Smalley-General Co., Bay City, Mich.

THUMB SCREWS AND NUTS
See Screws.

TINSMITHS' TOOLS
Brown, Boggs & Co., Hamilton, Can.
Williams & Wilson, Ltd., Montreal, Que.

TIRE BENDERS
Jardine & Co., Ltd., A. B., Hespeler.

TIRE SETTING MACHINES, HYDRAULIC
Perrin, Ltd., William R., Toronto.
West Tire Setter Co., Rochester, N.Y.

TOOL CASES
Rice Lewis & Son, Toronto, Ont.

TOOL HOLDERS
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL POSTS, LATHE
Armstrong Bros. Tool Co., Chicago.
Williams & Co., J. H., Brooklyn, N.Y.

TOOL ROOM PARTITIONS
Canada Wire & Iron Goods Co., Hamilton.

TOOLS, BENDING
Peck, Stow & Wilcox Co., Southington.

TOOLS, BLACKSMITHS'
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son Toronto, Ont.

TOOLS, ADJUSTABLE BORING
Kelly Reamer Co., Cleveland, O.
Williams & Wilson, Ltd., Montreal, Que.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago.
Williams Machy. Co., A. R., Toronto.
Ford-Smith Machine Co., Hamilton, Ont.
U. S. Electrical Tool Co., Cincinnati, O.

TOOLS, FORMING
Davidson Tool Mfg. Co., New York, N.Y.

TOOLS, LATHE, PLANER, SLOTTER
Armstrong Bros. Tool Co., Chicago.
Gisholt Machine Co., Madison, Wis.
Williams & Co., J. H., Brooklyn, N.Y.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

TORCHES, BLOW
Int. Mach. & Supply Co., Ltd., Montreal.

TORCHES, STEEL
Armstrong, Whitworth of Can., Montreal.
Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

TORCHES, GASOLINE, KEROSENE AND ALCOHOL
Turner Brass Works, Sycamore, Ill.

TRACK SYSTEMS
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

TRANSFORMERS
Can. General Electric Co., Toronto, Ont.
MacGovern & Co., Montreal, Que.

TRANSMISSION CHAIN
Morris Chain Co., Ithaca, New York.

TRANSMISSION MACHINERY
American Pulley Co., Philadelphia, Pa.
Can. Link-Belt Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Coventry Chain Co., Coventry, England.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Kennedy & Sons, Wm., Owen Sound, Ont.
Morse Chain Co., Ithaca, N.Y.
Wilson & Co., J. C., Belleville, Ont.
Williams Machinery Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

TRANSMISSION ROPE
Jones & Glassco, Montreal, Que.
MacKinnon Steel Co., Ltd., Sherbrooke.
Wilson & Co., J. C., Belleville, Ont.

TRANSMISSION TOWERS
Curtis Pneumatic Machy. Co., St. Louis.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

TRANSVEYORS
Cowan Truck Co., Holyoke, Mass.

TROLLEYS
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.
Wright Mfg. Co., Lisbon, Ohio.

TRUCKS, FACTORY, FREIGHT, ETC
Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing, Toronto.
Cowan Truck Co., Holyoke, Mass.
MacKinnon Steel Co., Sherbrooke, Que.
Rice Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN
Swedish Steel & Importing Co., Montreal.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS AND COPPER
Standard Tube & Fence Co., Woodstock.
Tallman Brass & Metal Co., Hamilton.

TUBING COILERS, FLEXIBLE METAL
Almond Mfg. Co., Ashburnham, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.

TURRET MACHINES, LATHES
Brown & Sharpe Mfg. Co., Providence.
Garlock-Walker Machinery Co., Toronto.
Greenfield Tap & Die Corp., Greenfield.
Oliver Mchy. Co., Grand Rapids, Mich.
Pratt & Whitney, Hartford, Conn.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

TUNGSTEN FILAMENT COILING MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINES, HORIZONTAL
Wilson & Co., J. C., Belleville, Ont.

TURBO GENERATOR UNITS
MacGovern & Co., Montreal, Que.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURNBUCKLES
Canada Fdrs. & Forg. Ltd., Welland.
, Morrow Screw & Nut Co., Ingersoll, Ont.
Rice Lewis & Son, Toronto, Ont.

TURNTABLES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

UPSETTING AND BENDING MACHINERY
Bertram & Sons Co., John, Dundas.
Brown, Boggs Co., Ltd., Hamilton, Can.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto.
Jardine & Co., A. B., Hespeler, Ont.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

VALVE LEATHERS
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co., Toronto.

VALVES, HYDRAULIC
Metalwood Mfg. Co., Detroit, Mich.

VENTILATING APPARATUS
Brantford Oven & Rack Co., Brantford.
Can. Blower & Forge Co., Kitchener, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

VISE STANDS, PORTABLE
Williams & Co., J. H., Brooklyn, N.Y.

VISES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
Foss Machy. & Sply. Co., G. F., Montreal.
Williams & Wilson, Ltd., Montreal, Que.

VISES, PIPE
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Marshall, Son & Bunney, Toronto.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

VISES, PLANER AND SHAPER
Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Williams & Wilson, Ltd., Montreal, Que.

WASHER MACHINES
National Machy. Co., Tiffin, Ohio.

WASHERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnes, Wallace, Co., Bristol, Conn.
Graton & Knight Mfg. Co., Worcester.
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Norton, Ralph B., Agent, Montreal.
London Bolt & Hinge Wks., London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

INDEX TO ADVERTISERS

FOUR FEATURES
OF THE
C.M.C. HEADSTOCK, on quick change geared lathes

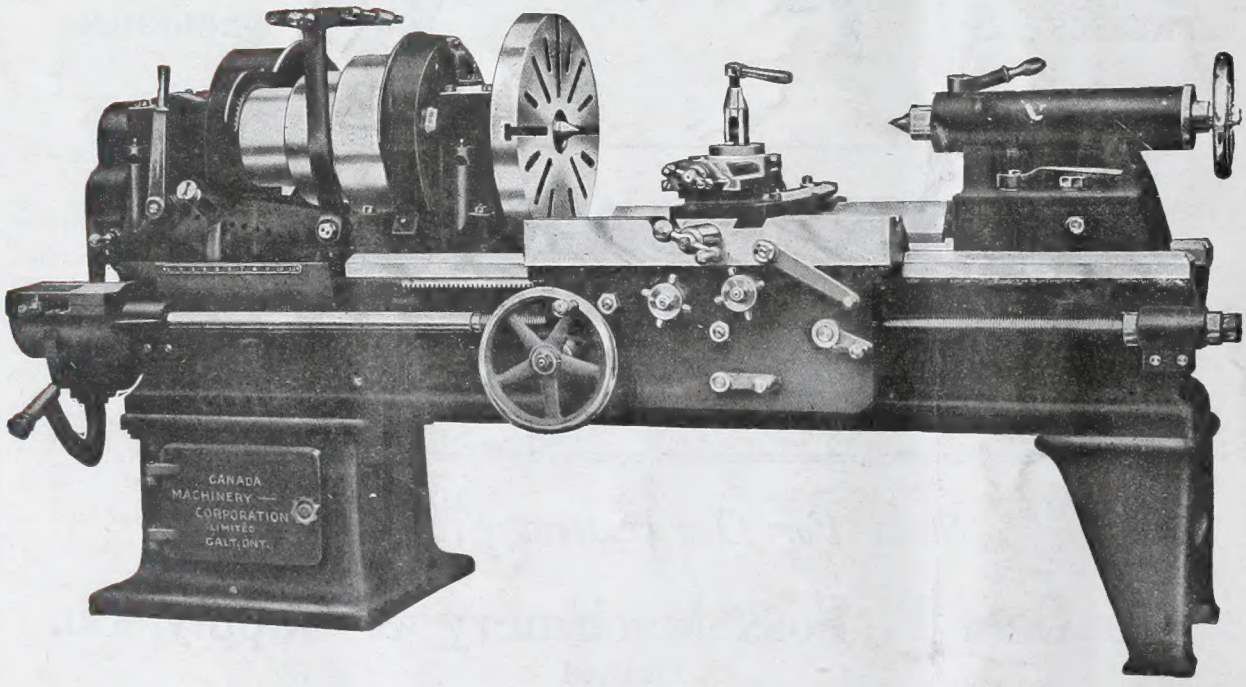
C.M.C.

(1) The three step cone double back geared drive permitting the use of extra wide belts and resulting in a strong drive combined with ample number of spindle speeds.

(2) The quick change gear mechanism which enables the operator to cut practically all the threads in every-day use without calculation or removal of gears.

(3) Our improved belt shifter which besides saving time forms a safety device preventing injury to the operator.

(4) Split phosphor bronze bearings with extra large oil chambers fed through large holes fitted with instantly removable plugs. No squirting with small oil cans through minute oil holes.



CANADA MACHINERY CORPORATION, GALT, ONTARIO
LIMITED

Toronto Office and Warerooms: Brock Avenue Subway